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FLORA OF GUATEMALA

PART II: GRASSES OF GUATEMALA

JASON R. SWALLEN

BAMBOOS

F. A. McCLURE

FIELDIANA: BOTANY

VOLUME 24, PART II

Published by

CHICAGO NATURAL HISTORY MUSEUM

NOVEMBER 10, 1955

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PART II: GRASSES

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Grasses of Guatemala

INTRODUCTION

The grasses of Guatemala were treated by A. S. Hitchcock ("The Grasses of Central America," Contr. U. S. Nat. Herb. 24: 557-762. 1930). This account was based primarily on the early collections of Heyde and Lux, Thiéme, and John Donnell Smith, and those of A. S. Hitchcock in 1911. In recent years P. C. Standley and Julian A. Steyermark have collected extensively in Guatemala, adding many grasses to the known flora, including a relatively large number of new species.

Phytogeographically, British Honduras is similar to the Petén region of Guatemala. The grasses of this country are included, although there are relatively few that are not found in Guatemala. Recent important collections are those of H. H. Bartlett, Percy Gentle, and C. L. Lundell.

The present treatment includes 120 genera and 455 species, both native and introduced. The large number of species is due, at least in part, to the diverse habitats, ranging from tropical lowlands to subalpine meadows. The largest genera are *Panicum*, *Paspalum*, and *Andropogon*, accounting for approximately one-third of the grass flora.

The arrangement of the genera and species is alphabetical, to conform to the original plan of the Flora. While there are certain advantages of this style, closely related genera and species may be widely separated in the text.

The synonymy has been restricted to name-giving synonyms and others which are important from the historical point of view. Common names have been included as far as possible.

Many of the illustrations have been taken from the Manual of Grasses of the United States and the Manual of Grasses of the West Indies by A. S. Hitchcock. The others have been prepared by Mr. Samuel H. Grove, Jr., of Chicago Natural History Museum, and Mr. John Ihle, formerly of the same institution, except as otherwise credited.

The author is indebted to Dr. F. A. McClure, who has kindly prepared the manuscript for the Bambuseae.

GRAMINEAE¹

Flowers perfect (rarely unisexual), arranged in spikelets consisting of a shortened axis (rachilla) and 2 to many 2-ranked bracts, the lowest two (glumes, rarely one or both obsolete) empty, each succeeding one or more (lemmas) bearing in their axils a single flower (one to few of the lower lemmas sometimes barren, and the upper one or more often reduced and sterile), and between the flower and rachilla a 2-nerved bract (palea), the lemma, palea, and included flower constituting the floret; stamens 1 to many, usually 3, with delicate filaments and 2-celled anthers; pistil 1, with a 1-celled 1-ovuled ovary, 2 (rarely 1 or 3) styles, and usually plumose stigmas; fruit a caryopsis, the grain rarely free from the pericarp. Herbaceous or sometimes woody plants with round or somewhat flattened, hollow or solid stems (culms), and 2-ranked, usually parallel-veined leaves consisting of a sheath which envelopes the culm, a blade, usually flat, and between the two on the inside a membranaceous or hairy appendage (ligule), this rarely obsolete.

Stems woody (see also *Olyra* and *Lasiacis*); leaf blades petiolate, ultimately disarticulating from their sheaths; culm sheaths and their blades markedly different from the sheaths and blades of functional leaves in size and shape. Native or exotic bamboos.²

Native bamboos.

Flowering material available.

Inflorescences indeterminate³ *Guadua*.

Inflorescences determinate.⁴

Spikelets several-flowered..... *Arthrostylidium*.

Spikelets with but one functional floret.

Spikelets terminating above in a rudiment..... *Merostachys*.

Spikelets terminating above in a functional floret..... *Chusquea*.

Flowering material not available (field key).

Culm internodes not hollow..... *Chusquea*.

Culm internodes hollow.

Lower main branches with some twigs reduced to spines..... *Guadua*.

All branches unarmed.

¹ References: Manual of Grasses of the United States, U. S. Dept. Agr. Misc. Pub. 200. 1951 (revised). Manual of Grasses of the West Indies, U. S. Dept. Agr. Misc. Pub. 243. 1936. North American Flora 17 (5, 6) 1935; (7) 1937; (8) 1939. Flora of Panama: Gramineae, Ann. Mo. Bot. Gard. 30: 104-280. 1943.

² The scope of this key is limited to those bamboos known to occur in Guatemala.

³ New branches (pseudospikelets) may arise from buds in the axils of the bracts found just below each spikelet.

⁴ All axes of the inflorescence complete their growth at once; no new branching takes place within the inflorescence.

Culm sheath¹ blades appressed to the culm.....*Arthrostylidium*.

Culm sheath blades reflexed.....*Merostachys*.

Exotic bamboos.

Flowering material available.

Stamens 3; leaf blades typically tessellate-veined.

Inflorescences determinate, racemose or paniculate, with long-pedicelled, not crowded spikelets, the pedicels subtended by inconspicuous, often obsolete bracts.....*Arundinaria*.

Inflorescences indeterminate, sometimes more or less densely aggregated in heads, with short-pedicelled spikelets, the pedicels subtended by conspicuous bracts.....*Phyllostachys*.

Stamens 6; leaf blades not typically tessellate-veined.

Palea of terminal functional floret bearing a slender, bristle-like rachilla segment hidden in its dorsal sulcus.....*Schizostachyum*.

Palea of terminal functional floret not bearing a bristle-like rachilla segment.

Palea never keeled.....*Melocanna*.

Palea 2-keeled in lowermost functional florets.

Stamens monadelphous or with flattened filaments connate.

Gigantochloa.

Stamens free, the filaments filiform.

Rachilla segments abscissile, the spikelet disarticulating readily; fruit a sulcate caryopsis with a thin, adnate pericarp.*Bambusa*.

Rachilla segments not abscissile except below the first lemma, the spikelet not disarticulating; fruit a globose nut, with a thick, separable pericarp.....*Dendrocalamus*.

Flowering material not available (field key).

Rhizome indeterminate, slender, wide-ranging; leaf blades typically tessellate-veined.

Branch complement with one strongly dominant central branch, this either solitary or flanked by one to several pairs of progressively shorter and more slender ones.....*Arundinaria*.

Branch complement typically consisting of two somewhat unequal branches, with sometimes a third, much smaller between them.

Phyllostachys.

Rhizome determinate, thick, short; leaf blades not typically tessellate-veined.

Rhizome neck (the slender, terete, budless, rootless, horizontal structure basal to the rhizome proper) several times as long as the rhizome proper, up to 1 meter or more in length.....*Melocanna*.

Rhizome neck much shorter than the rhizome proper.

¹Throughout the part of this key that deals with bamboos, and in the descriptions of the bamboos that follow, wherever the term "culm sheath" appears it refers to examples of these structures taken from the lower part of the culm, usually from some node between the fifth and the tenth; exceptions are clearly indicated.

Culm sheath blade narrow, reflexed.

Branch complement with numerous, slender, subequal branches.
Schizostachyum.

Branch complement with one strongly dominant central branch,
this either solitary or flanked by several pairs of progressively
shorter, more slender ones. *Gigantochloa.*

Culm sheath blade broadly triangular, appressed to the culm.

Leaf blades in the lower part of the culm pubescent on both surfaces.
Dendrocalamus.

Leaf blades pubescent throughout lower surface only. . . . *Bambusa.*

Stems mostly herbaceous, or woody only at the base (woody throughout in *Olyra latifolia*, and most species of *Lasiacis*); leaf blades usually not petiolate, and not disarticulating from their sheaths; culm sheaths and their blades not markedly different from the sheaths and blades of the functional leaves.

Spikelets 1- to many-flowered, the reduced florets, if any, above the fertile florets (except in *Hierochloa*; lower florets empty in *Uniola*); articulation usually above the glumes (below the glumes in *Zeugites*, *Cinna*, *Polypogon*, *Oryza*, and *Leersia*).

Spikelets in groups of 2-5, the groups racemose along a common axis, falling entire.

Plants annual.

Groups of spikelets nodding; first glumes relatively thin, not forming an involucre. *Aegopogon.*

Groups of spikelets erect; first glumes broad, indurate, forming a pitcher-shaped involucre around the spikelets. *Antheophora.*

Plants rigid; perennial. *Hilaria.*

Spikelets solitary or paired, not arranged in groups along a common axis.

Lemma with a long much-contorted awn, the awns becoming tangled and remaining attached at the apex of the axis; broad-leaved perennials.
Streptochaeta.

Lemma awnless, or if awned, the awn straight or geniculate, never contorted or becoming tangled.

Spikelets unisexual. Plants monoecious.

Spikelets in somewhat distant pairs along the main branches, one of each pair sessile, pistillate, the other long-pedicellate, staminate, much smaller than the pistillate spikelet; stamens 6. . . . *Pharus.*

Spikelets not in pairs as above; stamens 2 or 3.

Glumes wanting, only the lemma and palea present; aquatic grasses with the staminate and pistillate spikelets in separate inflorescences. *Luziola.*

Glumes present; terrestrial, usually forest grasses.

Panicles large, terminal, the pistillate spikelets on the upper branches and toward the ends of the lower ones, the staminate on the lower part of the lower branches. *Olyra.*

Panicles small, axillary, or terminal and axillary, the terminal when present usually wholly staminate.

Fruit roughly triangular, inflated, gibbous; panicles axillary, composed of 1 terminal pistillate spikelet, and a few staminate spikelets below it. *Lithachne*.

Fruit subcylindric; panicles terminal and axillary. Fruit raised on the enlarged and thickened segment of the rachilla. *Cryptochloa*.

Spikelets perfect, or if unisexual, the plants dioecious (except *Cathestecum*).

Spikelets sessile on opposite sides of a continuous or disarticulating rachis.

Spikelets placed edgewise to the rachis; first glume wanting. *Lolium*.

Spikelets placed flatwise to the rachis; both glumes present. *Triticum*.

Spikelets sessile or short-pedicellate on one side of a continuous rachis.

Plants monoecious, the florets unisexual (rarely perfect). *Cathestecum*.

Plants with perfect flowers.

Spikelets 1-flowered, with no rudimentary florets above the fertile one.

Spikes solitary *Microchloa*.

Spikes digitate *Cynodon*.

Spikes racemose *Spartina*.

Spikelets 2-several-flowered or, if only 1-flowered, with one or more rudimentary florets above the perfect one.

Spikes digitate.

Lemmas awnless, or awn pointed.

Rachis prolonged beyond the spikelets in a naked point. *Dactyloctenium*.

Rachis not prolonged *Eleusine*.

Lemmas awned *Chloris*.

Spikes solitary or racemose.

Spikes solitary *Tripogon*.

Spikes several to many, racemose.

Lemmas entire or minutely bifid, awnless or 1-awned.

Rudiment 1-awned, sometimes reduced to one or two awns, rarely wanting.

Glumes exceeding the florets, both 1-nerved. *Gymnopogon*.

Glumes shorter than the florets, the first 1-nerved, the second usually 3-5-nerved *Gouinia*.

Rudiment awnless; rachilla and callus of the florets glabrous or nearly so *Leptochloa*.

Lemmas variously lobed or dentate, usually 3-awned.

Spikelets with one perfect floret and one or two rudimentary florets above it; rachis not prolonged beyond the spikelets (except as a single naked point in *B. glandulosa*) *Bouteloua*.

Spikelets with two perfect florets; rachis prolonged beyond the spikelets as two inconspicuous hairy bristles.

Pentarrhaphis.

Spikelets pedicellate in open or contracted panicles (sessile in loose spikes in *Jouvea*).

Spikelets 3-flowered, the lower two staminate, falling attached to the fertile lemma, no rudimentary florets above. . . . *Hierochloa*.

Spikelets 2-several-flowered, the rachilla usually disarticulating between the similar florets, the lower ones sometimes empty.

Lemmas awnless, or awned from the tip, sometimes from between the teeth of a minutely bifid apex.

Lemma or rachilla villous with long silky hairs (staminate spikelets glabrous in *Gynerium*); tall stout reeds.

Lemma hairy, rachilla glabrous; plants dioecious. . *Gynerium*.

Lemma naked, rachilla hairy; plants with perfect flowers.

Phragmites.

Lemma and rachilla glabrous or pubescent but not with long silky hairs.

Plants dioecious; culms erect from creeping rhizomes.

Staminate and pistillate spikelets similar in appearance.

Distichlis.

Staminate and pistillate spikelets very unlike, the staminate many-flowered, rather distant in a loose spike, the pistillate solitary or clustered, nearly hidden in the leaves *Jouvea*.

Plants with perfect flowers.

Blades ovate to lanceolate, with conspicuous transverse veins, most of them distinctly petiolate.

Glumes narrow, acute, without transverse veins; panicles usually large, the spikelets borne only at the ends of the fragile filiform branchlets. . . . *Orthoclada*.

Glumes broad with prominent transverse veins, the summit irregularly toothed. *Zeugites*.

Blades linear, with no transverse veins.

Lemmas 3-nerved. *Eragrostis*.

Lemmas 5- to several-nerved, the nerves sometimes obscure.

Spikelets with 1-4 empty lemmas below the fertile florets, large and very flat. *Uniola*.

- Spikelets with no empty lemmas below the fertile florets.
- Spikelets short-pedicellate, rather distant in a simple raceme *Brachypodium*.
- Spikelets in open or contracted panicles.
- Lemmas awned from between the teeth of the minutely bifid apex, conspicuously compressed *Bromus*.
- Lemmas awnless or awned from the tip, rounded or obscurely keeled.
- Lemmas acuminate or awned *Festuca*.
- Lemmas awnless, obtuse or acute.
- Spikelets inflated; palea much shorter and smaller than the lemma *Briza*.
- Spikelets not inflated; palea as long as the lemma.
- Lemmas prominently 7-nerved, the nerves parallel *Glyceria*.
- Lemmas 5-nerved, the nerves inconspicuous; keel and margins of lemma often pubescent *Poa*.
- Lemmas awned from the back; glumes as long as the lowest floret, usually about as long as the spikelet.
- Plants annual; spikelets large in open panicles *Avena*.
- Plants perennial; spikelets small in rather dense or spikelike panicles *Trisetum*.
- Spikelets 1-flowered.
- Spikelets strongly laterally compressed; glumes minute or wanting; articulation below the spikelet.
- Glumes minute; lemmas often awned *Oryza*.
- Glumes wanting; lemmas awnless *Leersia*.
- Spikelets terete, or at least not strongly compressed; glumes usually well developed; articulation above the glumes (below the glumes in *Cinna* and *Polypogon*).
- Glumes awned *Polypogon*.
- Glumes awnless, or, if awned, much shorter than the floret.
- Lemma with a very short awn from just below the apex.
Cinna.
- Lemma awnless or with a well-developed awn.
- Fertile spikelets surrounded by numerous sterile spikelets in the form of bristles or delicate bracts . . . *Pereilema*.
- Spikelets all perfect, not surrounded by bristles.
- Lemma indurate; callus bearded, usually sharp-pointed.
- Awn trifid, the lateral ones sometimes reduced or wanting *Aristida*.

Awn simple, geniculate, twisted.

Glumes much shorter than the floret; awn inserted from the back of the lemma *Trinichloa*.

Glumes as long as or longer than the floret; awn terminal.

Margins of lemma overlapping, enclosing the palea; callus narrow, acuminate, sharp-pointed *Stipa*.

Margins of lemma not meeting, exposing the sulcus of the palea, this projecting from the summit as a minute point; callus short, acute *Piptochaetium*.

Lemma not indurate; callus glabrous or, in *Calamagrostis*, bearded.

Glumes longer than the floret, equal.

Callus bearded; palea usually as long as the lemma. *Calamagrostis*.

Callus glabrous or nearly so; palea usually much shorter than the lemma, thin *Agrostis*.

Glumes, or at least one of them, shorter than the floret.

Lemma 3-nerved, acute, awned or awnless.

. *Muhlenbergia*.

Lemma 1-nerved, obtuse, awnless *Sporobolus*.

Spikelets with 1 perfect terminal floret and a sterile or staminate floret below it (both florets usually fertile in *Isachne*); articulation below the glumes (except in *Arundinella*), either in the pedicel, the rachis, or at the base of a cluster of spikelets.

Glumes membranaceous; fertile lemma indurate or at least as firm as the glumes; sterile lemma like the glumes in texture.

Fertile lemma scarcely firmer than the glumes, awned, the awns relatively long, geniculate.

Spikelets large, in groups of three at the ends of the branches.

. *Tristachya*.

Spikelets small, evenly distributed in the panicle *Arundinella*.

Fertile lemma usually much firmer than the glumes, awnless or awn-tipped.

Spikelets subtended by bristles or enclosed in spiny burs.

Spikelets subtended by bristles.

Bristles persistent.

Spikelets arranged in one-sided racemes, each subtended by a single bristle; blades not plaited *Ixophorus*.

Spikelets paniculate, the subtending bristles 2 or more, or if only one, the blades plaited *Setaria*.

Bristles deciduous, falling with the spikelet *Pennisetum*.

Spikelets enclosed in spiny burs *Cenchrus*.

Spikelets neither subtended by bristles nor enclosed in spiny burs.

Spikelets arranged on one side of spikelike racemes.

Margins of fertile lemma thin, not inrolled.

Spikelets densely covered with long tawny silky hairs. . . . *Trichachne*.

Spikelets glabrous or pubescent but not long-silky. . . . *Digitaria*.

Margins of fertile lemma inrolled, indurate.

Rachilla joint and first glume adnate, forming a swollen ring-like callus. *Eriochloa*.

Rachilla joint and first glume neither adnate nor swollen.

Racemes solitary (see also *Paspalum*).

Spikelets sunken in a thick corky rachis; rachis disarticulating at maturity. *Stenotaphrum*.

Spikelets not sunken in a thick corky rachis; rachis not disarticulating at maturity.

Spikelets conspicuously tuberculate-hispid; first glume acuminate, longer than the sterile lemma; raceme stout, stiffly spreading. *Echinolaena*.

Spikelets glabrous or hairy but not conspicuously tuberculate-hispid.

Rachis rather broadly winged, partially enfolding the spikelets; spikelets paired but rather distant, appearing as if solitary in a single row, the spikelets of each pair placed back to back. *Thrasya*.

Rachis wingless; spikelets solitary, the back of the fertile lemma turned from the rachis. *Mesosetum*.

Racemes 2 to many (sometimes solitary in *Paspalum*).

Spikelets awned or awn-pointed.

Base of spikelet elongate, forming a sharp-pointed bearded callus; both glumes long-awned. *Chaetium*.

Base of spikelet blunt, not bearded.

First glume long-awned, the body nearly as long as the spikelet; spikelets glabrous or pubescent but not hispid. *Oplismenus*.

First glume awnless, less than half as long as the spikelet; spikelets hispid. *Echinochloa*.

Spikelets awnless.

Fertile lemma with small wings at the base, these sometimes reduced to scars. *Ichnanthus*.

Fertile lemma wingless.

First and second glume equal, nearly as long as the spikelet, the second becoming spiny at maturity; racemes loosely flowered. *Pseudechinolaena*.

First glume not more than half as long as the spikelet, or wanting, the second as long as the spikelet, glabrous or pubescent but not spiny.

- Back of the fruit turned away from the rachis.
 First glume well developed.....*Brachiaria*.
 First glume wanting.....*Axonopus*.
 Back of the fruit turned toward the rachis.
 First glume always present.....*Panicum*.
 First glume usually wanting (often present in *P. langei* and occasionally in other species).
Paspalum.
 Spikelets paniculate (panicles dense and spikelike in *Sacciolepis* and *Hymenachne amplexicaulis*).
 Spikelets villous with appressed or spreading hairs.
 First glume present; spikelets with rose-colored, silky hairs obscuring the spikelet.....*Rhynchelytrum*.
 First glume wanting; spikelets with pale hairs, not obscuring the spikelet.....*Leptocoryphium*.
 Spikelets glabrous or pubescent.
 Fertile lemma with small wings at the base, these sometimes reduced to scars.....*Ichnanthus*.
 Fertile lemma wingless.
 Spikelets with 2 fertile florets.....*Isachne*.
 Spikelets with only 1 fertile floret.
 Second glume inflated, saccate at the base; spikelets unsymmetrical.....*Sacciolepis*.
 Second glume not inflated; spikelets symmetrical.
 First and second glume equal, similar, as long as the spikelet; plants widely decumbent-spreading...*Homolepis*.
 First glume rarely more than half as long as the second, the latter usually equalling or exceeding the fruit.
 Panicles dense, spikelike or with narrowly ascending branches; fruit scarcely indurate, open at summit.
Hymenachne.
 Panicles mostly open, loosely flowered; fruit indurate, closed at summit, the lemma tightly enclosing the palea.
 Spikelets with a tuft of woolly hairs at the tip of the second glume and sterile lemma; plants woody, clambering.....*Lasiacis*.
 Spikelets without woolly hairs; plants herbaceous.
Panicum.
 Glumes indurate; fertile lemma hyaline or membranaceous, the sterile lemma like the fertile one in texture; spikelets arranged in pairs in narrow spikes or racemes.
 Spikelets with perfect flowers, each perfect spikelet usually paired with a staminate or reduced sterile spikelet, or sometimes all the spikelets perfect and alike.
 Blades ovate, cordate-clasping; plants creeping; annual.....*Arthraxon*.

Blades linear; culms erect.

Racemes paniculate (see also *Andropogon saccharoides*).

Panicles conspicuously silky; spikelets awnless.

Panicles white or pinkish, loose but rather dense.

Rachis continuous; spikelets unequally pedicellate. . . . *Imperata*.

Rachis breaking up at maturity; lower spikelet sessile, the upper pedicellate. . . . *Saccharum*.

Panicles golden brown, very dense and compact. . . . *Eriochrysis*.

Panicles not silky; spikelets awned.

Pedicellate spikelet staminate. . . . *Sorghum*.

Pedicellate spikelet wanting, only the pedicel present.

Sorghastrum.

Racemes solitary, paired, or digitate, sometimes aggregate in a large compound inflorescence; if paniculate, the racemes crowded in a dense, silky, terminal panicle.

Spikelets all perfect, alike; racemes digitate; spikelets awnless.

Ischaemum.

Spikelets of each pair unlike, the lower sessile, perfect, the upper pedicellate, usually reduced (conspicuous in *Hackelochloa* and *Diectomis*).

Spikelets awnless.

Plants annual; rachis joint and the pedicel of the upper spikelet grown together; first glume of sessile spikelet globose, alveolate. . . . *Hackelochloa*.

Plants perennial; rachis joint and pedicel distinct.

Rachis joints and pedicels much thickened at the summit, glabrous; pedicellate spikelet rudimentary. . . *Manisuris*.

Rachis joints and pedicels not much thickened at the summit; pedicellate spikelet staminate or neuter. . . . *Elyonurus*.

Spikelets, at least the fertile ones, awned.

Culms simple, usually with a single terminal erect raceme.

Glumes of staminate spikelets conspicuous; both spikelets of the lower few to several pairs staminate or neuter, awnless, the rest of the sessile spikelets perfect, long-awned.

Heteropogon.

Glumes of staminate spikelets inconspicuous; all pairs of spikelets alike, the sessile bearing a relatively slender plumose awn. . . . *Trachypogon*.

Culms branching, at least toward the summit; awns glabrous or scabrous.

Pedicellate spikelet conspicuous, the first glume broad, awned, obscuring the spikelets; awn of fertile lemma 4-5 cm. long, geniculate; plants annual. . . . *Diectomis*.

Pedicellate spikelet inconspicuous; awn of fertile lemma usually less than 15 mm. long; plants perennial.

- First glume sharply 2-keeled, at least toward the summit.
 Spikelets of all pairs unlike, the sessile fertile, the pedicellate sterile.....*Andropogon*.
 Spikelets of the lower pairs alike, staminate or neuter.
Cymbopogon.
 First glume of sessile spikelet rounded on the back, the margins involute.....*Hyparrhenia*.
 Spikelets unisexual, the staminate and pistillate spikelets in separate inflorescences or the staminate above and the pistillate below in the same spike.
 Staminate spikelets in a terminal tassel, the pistillate in the axils of the leaves.
 Pistillate spikes distinct, the spikelets embedded in the hardened rachis, this disarticulating at maturity.....*Euchlaena*.
 Pistillate spikes grown together forming an ear, the grains at maturity much exceeding the glumes.....*Zea*.
 Staminate spikelets above, the pistillate below in the same spike.
 Spikes short, the 1- or 2-flowered pistillate portion enclosed in a bead-like sheathing bract.....*Coix*.
 Spikes elongate, many-flowered, the pistillate portion breaking up into joints, not enclosed in a sheathing bract.....*Tripsacum*.

AEGOPOGON Humb. & Bonpl.

Spikelets in groups of 3, the groups pedunculate, spreading, falling entire, arranged alternately on opposite sides of a slender flattened axis, the central spikelet fertile, the lateral ones staminate or neuter; spikelets 2-flowered; glumes equal, 1-nerved, notched at the apex, awned from between the lobes; lemmas 3-nerved, longer than the glumes, the nerves extending into awns.

Slender perennials with short, narrow, flat blades and small racemes, the groups of spikelets all turned to one side.

Species three, southwestern United States to Bolivia.

Lobes of glumes acute or awned, firm, purplish.....*A. cenchroides*.

Lobes of glumes broad, obtuse, papery.....*A. tenellus*.

Aegopogon cenchroides Humb. & Bonpl. ex Willd. Sp. Pl. 4: 899. 1806. *A. geminiflorus* H.B.K. Nov. Gen. & Sp. 1: 133. pl. 43. 1815. *A. guatemalensis* Gandog. Bull. Soc. Bot. France 66: 298. 1920. *Pajón del río* (Quezaltenango).

Shady banks, brushy hillsides, open grassy places, and roadsides, 1,350–2,700 meters; Alta Verapaz; Izabal; Guatemala; Sacatepéquez; Sololá; Quezaltenango. Mexico to Bolivia and Brazil.

Slender, spreading, perennial; culms 20–50 cm. long, erect, or the longer ones spreading, freely branching; sheaths glabrous, keeled; ligule hyaline, 1–2 mm. long, obtuse; blades 2–6 cm. long, 1–2 mm. wide, flat, acuminate, scabrous;



FIG. 1. *Aegopogon tenellus*. Plant, $\times \frac{1}{2}$; group of spikelets, $\times 5$; lateral spikelets and central spikelet, $\times 10$.

racemes slender, 2-5 cm. long, usually purple; spikelets about 3 mm. long, the central awn of the first floret about 10 mm. long, the others half as long or less.

Aegopogon tenellus (Cav.) Trin. Gram. Unifl. 164. 1824. *Lamarckia tenella* DC. Cat. Hort. Monsp. 1813. *Cynosurus tenellus* Cav. ex DC. Cat. Hort. Monsp. 120. 1813. *Aegopogon unisetus* Roem. & Schult. Syst. Veg. 2: 805. 1817. Figure 1.

Pastures, moist shady banks, and cultivated places, 1,500–2,100 meters; Guatemala; Sacatepéquez; Quezaltenango. Arizona; Mexico; El Salvador; Honduras; Costa Rica.

Similar to *A. cenchroides* but differing primarily in the broad obtuse lobes of the glumes.

AGROSTIS L.

Spikelets 1-flowered, the rachilla disarticulating above the glumes, sometimes prolonged beyond the floret; glumes equal or subequal, longer than the floret, usually acute or acuminate; lemma usually obtuse, thinner than the glumes, awnless, or awned from the back, glabrous or more or less hairy on the callus; palea wanting or nearly equaling the lemma.

Slender perennials with flat or involute blades and narrow or open panicles of small spikelets.

Species about 125, in temperate and cold regions of both hemispheres, and in the tropics at higher altitudes.

Palea well developed, as long as the lemma or nearly so.

Rachilla prolonged beyond the palea; panicles open, few-flowered... *A. exserta*.

Rachilla not prolonged; panicles dense, many-flowered..... *A. semiverticillata*.

Palea minute or wanting.

Panicles narrow, dense, the branches floriferous from the base.... *A. tolucensis*.

Panicles open, or if narrow, the branches naked toward the base.

Lemma awnless.

Culms 5–10 cm. high, densely tufted; blades short, firm, arcuate... *A. arcta*.

Culms more than 20 cm. high; blades lax.

Ligule truncate, 0.5–1 mm. long; spikelets 1.6–1.8 mm. long... *A. vesca*.

Ligule 3–5 mm. long; spikelets 2–3 mm. long..... *A. perennans*.

Lemma awned.

Culms weak, decumbent-spreading, 50–60 cm. long; spikelets 2 mm. long..... *A. laxissima*.

Culms erect, not more than 45 cm. high; spikelets 2.3–3 mm. long.

Panicles diffuse, the branchlets stiffly divaricate; spikelets 2.3–2.5 mm. long; awn tightly twisted below..... *A. abietorum*.

Panicles narrow with ascending branches; spikelets 2.5–3 mm. long; awn straight or nearly so..... *A. vinosa*.

Agrostis abietorum Swallen, Contr. U. S. Nat. Herb. 29: 403. 1950.

Known only from the type, Volcán Tajumulco, Dept. San Marcos, *Steyermark* 35652.

Perennial; culms tufted, erect, 25–45 cm. high; sheaths a little shorter than the internodes, glabrous; ligule 2–4 mm. long, decurrent; blades 4–7 cm. long,

1–1.5 mm. wide, flat or becoming involute, rather firm, scabrous; panicles 7–12 cm. long, diffuse, the branches solitary or in pairs, sparsely scabrous, naked at the base, the branchlets and usually the pedicels stiffly divaricate with a pulvinus in the axils; spikelets 2.3–2.5 mm. long; glumes acute, equal, or the first a little longer, scabrous on the keel; lemma 2 mm. long, scabrous on the nerves, these slightly excurrent, the awn 3 mm. long, inserted about one-fourth above the base, geniculate, tightly twisted below the bend, the callus sparsely bearded on the sides, the hairs short; anthers 1 mm. long.

Related to *A. laxissima* but differs in the stiff habit, the stiffly divaricate panicle branchlets, the longer lemma and anthers, and the tightly twisted awn.

Agrostis arcta Swallen, Contr. U. S. Nat. Herb. 29: 405. 1950.

Known only from the type collection, moist roadside at Santa Elena, Dept. Chimaltenango, *Skutch* 422.

Perennial; culms rather densely tufted, erect from a decumbent, rhizome-like base, 5–10 cm. high; sheaths glabrous, somewhat keeled; ligule 1–2 mm. long, decurrent; blades firm, folded or involute, curved, blunt, 2–6 cm. long, smooth below, scabrous above and on the margins; panicles 2–3.5 cm. long, the more or less scabrous branches appressed, naked at the base; spikelets 2.1–2.3 mm. long; glumes equal, acute, rather strongly scabrous on the keel; lemma 1.5–1.7 mm. long, truncate, minutely scabrous in lines, the nerves rather prominent at the summit, awnless or with a very slender short awn from the middle of the back; palea minute; anthers 0.6 mm. long.

Agrostis exserta Swallen, Contr. U. S. Nat. Herb. 29: 404. 1950.

Alpine areas, 3,400–3,700 meters, Huehuetenango (type from Tojquiá, Sierra de los Cuchumatanes, *Steyermark* 50119).

Perennial; culms slender, densely tufted, 10–20 cm. high, erect or ascending, glabrous, without culm nodes; sheaths glabrous, those of the innovations very short, the single culm sheath as much as 5.5 cm. long; ligule 1.5–2 mm. long; blades firm, involute, glabrous, curved, 1–4 cm. long; panicles 1–5 cm. long, few-flowered, purple, the short, smooth branches stiffly ascending, branching above the middle, the branchlets bearing one or two spikelets; spikelets 1.5–1.6 mm. long; glumes equal, somewhat cucullate, subacute, minutely scabrous on the keel; lemma about as long as the glumes, very obtuse, minutely erose, awnless or with a short, straight, slender awn from the middle of the back; palea a little shorter than the lemma; rachilla joint one-third as long as the floret.

This species is related to *A. bacillata* Hack., which differs in having culms with one or two nodes, longer, finer, and softer blades, more slender, flexuous, implicate panicle branches, and a much longer rachilla.

Agrostis laxissima Swallen, Contr. U. S. Nat. Herb. 29: 402. 1950.

Damp shady banks, dense *Abies-Cupressus* forests, and sandy *Alnus* forests, 2,400–3,200 meters; Totonicapán; Quezaltenango; San Marcos (type from along road between San Marcos and Serchil, Standley 85379).

Perennial; culms slender, weak, apparently decumbent-spreading, 50–60 cm. long; sheaths about as long as the internodes or a little shorter, glabrous; ligule 3–4 mm. long, decurrent; blades flat, lax, mostly 8–15 cm. long, 1–3 mm. wide, glabrous; panicles 7–8 cm. long, open, relatively few-flowered, the slender, sparsely scabrous branches ascending or spreading, somewhat flexuous, naked in the lower half; spikelets 2 mm. long; glumes equal, acute, scabrous on the keel; lemma 1.5 mm. long, thin, truncate, the nerves minutely excurrent, awned, the awn inserted one-third from the base, 3 mm. long, curved, scarcely twisted below, the callus with short hairs on the sides; palea minute; anthers 0.5 mm. long.

A specimen from Volcán Santa María, Department of Quezaltenango (*Steyermark* 34160), has spikelets 3 mm. long, and is doubtfully referred to this species.

Agrostis perennans (Walt.) Tuckerm. Amer. Jour. Sci. 45: 44. 1843. *Cornucopiae perennans* Walt. Fl. Carol. 74. 1788. *Trichodium perennans* Ell. Bot. S. C. and Ga. 1: 99. 1816.

In swamps, along streams, slopes, fields, and pastures, 1,300–3,700 meters; Alta Verapaz; Huehuetenango. Eastern United States and eastern Mexico.

Perennial; culms erect or ascending from a very slender base, as much as 1 meter high; sheaths smooth, mostly shorter than the internodes; ligule 3–5 mm. long; blades soft, lax, the lowermost often filiform, those of the culm 5–15 cm. long, 1–3 mm. wide; panicles 10–30 cm. long, the slender branches in rather distant whorls, naked below, the lower whorls with short branches intermixed; spikelets 2–3 mm. long, the glumes acuminate, scabrous on the keel; lemma 1.5–2 mm. long, awnless; palea minute or wanting.

Agrostis semiverticillata (Forsk.) C. Christ. Dansk. Bot. Arkiv. 4, pt. 3: 12. 1922. *Phalaris semiverticillata* Forsk. Fl. Aegypt. Arab. 17. 1775. *Agrostis verticillata* Vill. Prosp. Pl. Dauph. 16. 1779. *A. alba* var. *verticillata* Pers. Syn. Pl. 1: 76. 1805.

Wet ground along streams and ditches, 1,250–1,800 meters; Sacatepéquez; Chimaltenango; Quezaltenango. Western United States to Argentina; introduced from the Eastern Hemisphere.

Culms erect to widely decumbent-spreading and rooting at the nodes, 15–50 cm. long or sometimes longer; sheaths shorter than the internodes, glabrous; blades mostly 4–12 cm. long, 3–6 mm. wide, firm, scabrous; panicles 3–10 cm. long, densely flowered, lobed, the branches bearing spikelets to the base; spikelets 2 mm. long, usually falling entire, the glumes equal, subobtus, very scabrous; lemma 1 mm. long, truncate, awnless; palea nearly as long as the lemma, awnless.

***Agrostis tolucensis* H.B.K. Nov. Gen. & Sp. 1: 135. 1815.**

Rocky slopes, summits, and volcano craters, 3,000–4,400 meters; Chimaltenango; Sololá; Huehuetenango; Quezaltenango; San Marcos. Southern Mexico to Chile.

Perennial; culms densely tufted, erect, 10–30 cm. or sometimes as much as 50 cm. high; blades soft to rather firm, loosely involute or the culm blades flat, usually less than 1 mm. wide; ligule 1–3 mm. long, decurrent; panicles 3–10 cm. long, narrow, rather dense, the branches appressed, most of them floriferous to the base; spikelets about 3 mm. long, the glumes subequal, acuminate, scabrous on the keel; lemma about 2 mm. long, minutely dentate, awned from near the base, about as long as the glumes, somewhat bent; palea wanting.

***Agrostis vesca* Swallen, Contr. U. S. Nat. Herb. 29: 406. 1950.**

Moist roadsides and clay slopes, 2,400–4,600 meters; San Marcos; Chimaltenango (type from Santa Elena, *Skutch* 420).

Perennial; culms very slender, erect from a decumbent base, 20–30 cm. high; sheaths about as long as the internodes, glabrous; ligule truncate, erose, 0.5–1 mm. long; culm blades mostly 5–9 cm. long, about 1 mm. wide, flat, smooth below, scaberulous above, those of the innovations involute, filiform, sometimes elongate; panicle 4–8 cm. long, purple, the slender nearly glabrous branches ascending, branching above the middle, the branchlets few-flowered; spikelets 1.6–1.8 mm. long; glumes equal or nearly so, rather broadly acute; lemma 1.3–1.4 mm. long, truncate, minutely erose, awnless; palea minute; anthers 0.8 mm. long.

***Agrostis vinosa* Swallen, Contr. U. S. Nat. Herb. 29: 402. 1950.**

Alpine meadows and pine-*Juniperus* woodland, 3,100–3,750 meters; Huehuetenango (type from Chémal, *Steyermark* 50290).

Perennial; culms tufted, erect, 9–26 cm. high, with only one node evident above the base; leaves mostly crowded at the base, the blades firm, stiff, mostly arcuate, 1–4 cm. long, involute, scabrous; ligule 1–2 mm. long, decurrent; panicles 3–10 cm. long, dark purple, the slender scabrous branches appressed, in fascicles of 2–4, rarely with short branches intermixed, usually spikelet-bearing well above the middle, the lower ones as much as 4 cm. long; spikelets 2.5–3 mm. long; glumes unequal, acute or acuminate, scabrous on the keel; lemma 1.6–1.8 mm. long, truncate, awned, the awn inserted one-fourth above the base, about 2 mm. long, scabrous, straight or nearly so, the callus bearded on the sides with short hairs; palea wanting; anthers 1.2–1.3 mm. long.

ANDROPOGON L.

Spikelets arranged in pairs at each node of a disarticulating rachis, one sessile and perfect, the other pedicellate and staminate or neuter, often very much reduced, the rachis and sterile pedicels sparsely to usually densely ciliate or villous; glumes of sessile spikelet indurate, the first flat, sulcate, or rounded on the back, several-nerved, the median nerve obscure or wanting, the margins keeled

toward the summit; sterile lemma hyaline; fertile lemma hyaline, narrow, shorter than the glumes, awnless or usually awned from the apex or from between lobes, the awn straight, or geniculate and twisted below; pedicellate spikelet as large as the sessile, or more or less reduced, sometimes only the pedicel present, the glumes not indurate.

Annuals or usually coarse perennials with solid culms, the spikelets arranged in racemes, these sessile and crowded on a common axis, paniculate, or usually solitary or paired, sometimes in 3's or 5's, the common peduncle enclosed or exerted from a spathe-like sheath, these sheaths often aggregate in a loose or dense, often silky, compound inflorescence.

The genus, in the broad sense, comprises nearly 200 species, in warm-temperate and tropical regions of both hemispheres.

Racemes solitary on each peduncle.

Plants annual.

Culms very slender, widely spreading, freely branching *A. brevifolius*.

Culms erect or nearly so, relatively coarse, the branches short, appressed.

Blades pilose on the upper surface toward the base; rachis joints and sterile pedicels glabrous above, villous below, the hairs not obscuring the spikelets *A. semitectus*.

Blades not pilose; rachis joints and sterile pedicels densely villous throughout, the hairs obscuring the spikelets *A. malacostachyus*.

Plants perennial.

Spikelets awnless; inflorescence dense.

Racemes 1 cm. long, nearly glabrous *A. virgatus*.

Racemes 2-3 cm. long, densely hairy *A. bicornis*.

Spikelets awned; inflorescence loose, the racemes usually scattered.

Racemes very flexuous, conspicuously villous *A. microstachyus*.

Racemes straight, not conspicuously villous, the spikelets appressed.

First glume of sessile spikelet usually densely villous *A. hirtiflorus*.

First glume of sessile spikelet glabrous.

Sessile spikelet 5 mm. long; blades 2-5 mm. wide *A. semiberbis*.

Sessile spikelet 4 mm. long; blades usually not more than 1.5 mm. wide *A. tener*.

Racemes two or more.

Racemes numerous, sessile, crowded along a common axis in a dense, white or silvery inflorescence.

Sessile spikelet 5 mm. long, pitted above the middle *A. altus*.

Sessile spikelet 4 mm. long, not pitted *A. saccharoides*.

Racemes few to several, paniculate, the panicles terminal on the main culm and short branches.

Culms decumbent or straggling, rooting at the nodes; panicle branches flexuous, pilose in the axils *A. condylotrichus*.

Culms erect; panicle branches straight, glabrous in the axils . . . *A. hypogynus*.

Racemes 2-5, sessile, paired, or digitate.

Spikelets awnless.

Ligule 2 mm. long; tips of blades acute, not boat-shaped; spikelets 3 mm. long. *A. leucostachyus*.

Ligule less than 1 mm. long; tips of blades boat-shaped; spikelets about 4 mm. long. *A. selloanus*.

Spikelets awned.

Spikelets of the lower pair alike; second glume with a slender divergent awn. *A. angustatus*.

Spikelets of the lower pair unlike; second glume awnless.

Pedicellate spikelet as long as the sessile, staminate. *A. gerardi*.

Pedicellate spikelet greatly reduced, neuter.

Racemes aggregate in a dense inflorescence, the ultimate branchlets densely villous below the spathes.

Spathes broad, conspicuous; some of the peduncles of the terminal inflorescences elongate. *A. elliotii*.

Spathes narrow, inconspicuous; inflorescence plume-like.

A. glomeratus.

Racemes scattered in a long, loose inflorescence, the ultimate branchlets glabrous or nearly so below the spathes. *A. virginicus*.

***Andropogon altus* Hitchc. Contr. U. S. Nat. Herb. 17: 208. 1913.**

Open places, up to 1,500 meters; Huehuetenango; Chiquimula; Guatemala. Mexico; El Salvador; Bolivia; Argentina.

Perennial; culms in small clumps, 1-1.5 meters high, erect or ascending at the base, smooth, the nodes bearded with stiff ascending hairs, these usually rather short; sheaths longer or shorter than the internodes, glabrous; ligule membranaceous, 3-4 mm. long; blades 15-30 cm. long, 5-10 mm. wide, acuminate, scabrous, with a few long hairs on the upper surface near the base; panicles 15-20 cm. long, dense, the racemes narrowly ascending or appressed, the rachis joints and sterile pedicels densely villous with white hairs 5-8 mm. long; sessile spikelet 5 mm. long, bearded at the base, scabrous on the keels toward the summit, the first glume pitted above the middle; awn 1.5-2 cm. long, geniculate, tightly twisted below the bend, loosely twisted above; pedicellate spikelet reduced, 3-4 mm. long, awnless.

***Andropogon angustatus* (Presl) Steud. Syn. Pl. Glum. 1: 370. 1854. *Diectomis laxa* Nees, Agrost. Bras. 340. 1829. Not *Andropogon laxus* Willd. 1806. *Diectomis angustata* Presl, Rel. Haenk. 1: 333. 1830. *Andropogon apricus* Trin. Mém. Acad. St. Pétersb. VI. Sci. Nat. 2 (1): 83. 1836.**

Brushy or rocky slopes and pine-clad hills; Jalapa; Jutiapa; Santa Rosa. Cuba; southern Mexico; Nicaragua; Panama to Colombia and northern Brazil.

Slender, erect perennial; culms 50–120 cm. high, glabrous; sheaths much shorter to longer than the internodes, compressed, keeled, auriculate, glabrous; ligule firm, 1–2 mm. long, fused with the auriculate summit of the sheath; blades linear, attenuate, 2–3 mm. wide, glabrous beneath, scabrous above and on the margins; flowering branches few to several from the upper sheaths, forming a loose inflorescence; racemes paired, rarely solitary, about 3 cm. long, at first partly included, finally exserted on long, slender, somewhat flexuous peduncles 5–10 cm. long; rachis joints and sterile pedicels thickened above, stiffly ciliate with white hairs; sessile spikelet 6 mm. long, the callus densely bearded with white hairs; first glume narrow, obtuse, deeply sulcate, glabrous; second glume compressed, keeled, with a slender divergent awn about 1 cm. long; awn of fertile lemma 3–4 cm. long, rather stout, brown, hispidulous, 2-geniculate, the lower segments tightly twisted, the upper straight; pedicellate spikelet 5 mm. long, the first glume not sulcate, long hairy on the margins, with a straight slender awn 2–6 mm. long.

***Andropogon bicornis* L. Sp. Pl. 1046. 1753. *Navajuela* (Izabal).**

Savannas, open or brushy slopes, and pine uplands, up to 1,500 meters; Petén; Alta Verapaz; Izabal; Huehuetenango; Sololá; Santa Rosa; Guatemala; Suchitepéquez; Retalhuleu. British Honduras; southern Mexico and the West Indies to Bolivia and Argentina.

Coarse perennial; culms 1–2.5 meters high, erect, in rather large clumps, glabrous; sheaths usually shorter than the internodes or the lower ones overlapping, broad, loose, keeled toward the summit, glabrous; ligule 1–1.5 mm. long, minutely erose-ciliate; blades elongate, 2–5 mm. wide, the lower surface glabrous on the midnerve, scabrous, the upper pubescent, the margins very scabrous, especially near the tip; flowering branches numerous from the upper sheaths, very compound, forming a very dense, corymbose feathery inflorescence; racemes paired, 2–3 cm. long, partly enclosed or exserted on long slender peduncles from the narrow inconspicuous spathes, the rachis and sterile pedicels densely hairy, the hairs spreading, as much as 5 mm. long; sessile spikelet 3 mm. long, awnless, glabrous; pedicellate spikelet rudimentary, or occasionally larger than the sessile one.

***Andropogon brevifolius* Swartz, Prodr. Veg. Ind. Occ. 26. 1788. *A. obtusifolius* Poir. in Lam. Encycl. Suppl. 1: 583. 1810. *Pollinia brevifolia* Spreng. Pl. Pugill. 2: 13. 1815. *Schizachyrium brevifolium* Nees ex Kunth, Enum. Pl. 1: 488. 1833. *Sorghum brevifolium* Kuntze, Rev. Gen. Pl. 2: 791. 1891.**

Dry hills and rocky slopes, up to 2,500 meters; Sacatepéquez; Guatemala; Escuintla. British Honduras (El Cayo District); tropical regions of both hemispheres.

Slender annual; culms 15 cm. to nearly 1 meter long, forming loose tangles or dense mats, ascending from a decumbent base or trailing, freely branching, glabrous; sheaths usually much shorter than the internodes, compressed, keeled, glabrous; ligule membranaceous, about 0.5 mm. long; blades oblong, obtuse, navicular, 1–4 cm. long, 1–5 mm. wide, glabrous, the margins scaberulous, minutely

ciliate at the base; flowering branches slender, numerous, from the middle and upper nodes; racemes solitary, delicate, 1-2 cm. long, partly included in the spathe, the rachis and sterile pedicel glabrous; sessile spikelet 2.5-3 mm. long, the callus bearded, otherwise glabrous, the slender awn about 8 mm. long, geniculate, tightly twisted below the bend; pedicellate spikelet reduced to a minute slender-awned rudiment.

Andropogon condylotrichus Hochst. ex Steud. Syn. Pl. Glum. 1: 377. 1854. *A. piptatherus* Hack. in Mart. Fl. Bras. 2 (3): 293. 1883. *Amphilophis piptatherus* Nash, N. Amer. Fl. 17: 127. 1912. *Euclasta condylotricha* Stapf in Prain, Fl. Trop. Afr. 9: 181. 1917.

Grassy plains and brushy slopes, 400-900 meters; Chiquimula. Mexico and the West Indies to Colombia, Venezuela, and northern Brazil.

Annual; culms commonly 1-2 meters long, decumbent or straggling, rooting at the nodes, sending up numerous weak branches, the nodes densely bearded, otherwise glabrous; sheaths usually shorter than the internodes, keeled toward the summit, glabrous on the back, villous in the throat and on the collar; ligule 1 mm. long, membranaceous, with a line of stiff hairs behind it; blades 15-20 cm. long, 4-8 mm. wide, flat, acuminate, sparsely papillose, the margins scabrous; racemes 2-5 cm. long, paniculate, the panicles terminal on the main culm and short branches from the upper sheaths, the panicle branches flexuous, densely villous in the axils; lower pairs of spikelets homogamous; fertile sessile spikelets 4 mm. long, the first glume densely villous, the awn 3-4 cm. long, 2-geniculate, the lower segments brown, tightly twisted, hispidulous, the terminal segment loosely twisted, scabrous; pedicellate spikelets 5-6 mm. long, sparsely papillose-pilose, the keels scabrous.

Andropogon elliottii Chapm. Fl. South. U. S. 581. 1860. *A. clandestinus* Wood, Class-book ed. 3: 809. 1861. Not *A. clandestinus* Nees, 1854. *Sorghum elliottii* Kuntze, Rev. Gen. Pl. 2: 791. 1891.

Sandy pine uplands, British Honduras (El Cayo District, *Lundell* 6727, 6785). Eastern United States; Cuba.

Perennial; culms slender to rather coarse, as much as 80 cm. high, rather sparingly branching from the upper nodes, densely bearded below the ultimate spathes; sheaths keeled, sparsely pilose, the lower ones broad, the upper ones becoming dilated and conspicuous; blades 3-4 mm. wide, usually pilose with long hairs on the upper surface toward the base; racemes usually in pairs, sometimes 3 or 4, partly included in the spathe or exerted on a long slender peduncle; racemes 3-5 cm. long, flexuous, the rachis and pedicels conspicuously villous; sessile spikelet narrow, 4-5 mm. long, the first glume acute, concave, the fertile lemma bearing a loosely twisted awn 10-15 mm. long; pedicellate spikelet very small or obsolete.

Andropogon gerardi Vitm. Summa. Pl. 6: 16. 1792. *A. furcatus* Muhl. in Willd. Sp. Pl. 4: 919. 1806.

Pine forests and limestone hills; Huehuetenango; Jalapa. United States; Mexico; Honduras.

Slender or coarse perennial; culms tufted, erect, as much as 2 meters high, simple or sparingly branching from the upper nodes; sheaths keeled or the upper ones rounded on the back, glabrous, or the lower ones sometimes pilose; blades elongate, commonly 3–5 mm. or as much as 10 mm. wide, often sparsely pilose toward the base, the margins very scabrous; racemes 2–6, sometimes solitary on the branches, straight, usually purple, the rachis joints and pedicels densely ciliate; sessile spikelet 7–10 mm. long, the first glume acuminate, sulcate, scabrous toward the tip, the awn 1–2 cm. long, geniculate, twisted below; pedicellate spikelet as long as the sessile but narrower, staminate, awnless.

Andropogon glomeratus (Walt.) B.S.P. Prel. Cat. N. Y. 67. 1888. *Cinna glomerata* Walt. Fl. Carol. 59. 1788. *Andropogon macrourus* Michx. Fl. Bor. Amer. 1: 56. 1803. *Sorghum glomeratum* Kuntze, Rev. Gen. Pl. 2: 790. 1891. *Andropogon virginicus* var. *corymbosus* Beal, Grasses N. Amer. 2: 52. 1896. *A. corymbosus* Nash in Britton, Man. 69. 1901.

Marshes, brushy banks, rocky places and open plains; Petén; Alta Verapaz; Izabal; Huehuetenango; Sacatepéquez; Sololá; Guatemala. Southeastern United States and the West Indies to Panama.

Similar in habit and aspect to *A. bicornis*; sheaths sometimes appressed-hirsute on the margins and toward the summit; ultimate branchlets densely hairy below the spathes; sessile spikelet 3–4 mm. long, awned, the awn slender, straight, about 1.5 cm. long; pedicellate spikelet very greatly reduced or usually wanting, the pedicel only present.

Andropogon hirtiflorus (Nees) Kunth, Rev. Gram. 1: Suppl. 39. 1830. *Streptachne domingensis* Spreng. ex Schult. Mant. 2: 188. 1824. Not *Andropogon domingensis* Steud., 1821. *Schizachyrium hirtiflorum* Nees, Agrost. Bras. 334. 1829. *Sorghum hirtiflorum* Kuntze, Rev. Gen. Pl. 2: 792. 1891. *Schizachyrium oligostachyum* Nash in Small, Fl. Southeast. U. S. 59. 1903. *Andropogon domingensis* F. T. Hubb. Proc. Amer. Acad. Sci. 49: 493. 1913. *Pajón blanco* (Huehuetenango).

Open or brushy slopes, pine and pine-oak forests, and meadows, 1,500–2,500 meters; Zacapa; Huehuetenango; Jalapa; Sacatepéquez; Sololá; Guatemala. Southern United States and the West Indies to Bolivia and Uruguay.

Perennial; culms tufted, erect, 0.4–1.5 meters, commonly about 1 meter high, glabrous; sheaths shorter than the internodes, or the lower ones overlapping, glabrous, keeled, at least toward the summit; ligule 1–1.5 mm. long, brownish; blades 10–20 cm. long, 2–4 mm. wide, or on robust plants as much as 30 cm. long and 8

mm. wide, scaberulous, the margins scabrous; racemes mostly 4–8 cm. long, few to numerous, scattered on the flowering branches from the upper nodes, forming a loose inflorescence; rachis joints and pedicels densely villous all over or only on the sides; sessile spikelets 5–6 mm. long, sparsely to densely villous, the middle of the back sometimes glabrous, the awn about 1 cm. long, geniculate, tightly twisted below the bend, loosely twisted above; pedicellate spikelet reduced to a small short-awned rudiment.

An extremely variable species in size, habit, and pubescence of the racemes.

Andropogon hypogynus Hack. in Mart. Fl. Bras. 2 (3): 290. *pl.* 66. 1883. *Hypogynium campestre* Nees, Agrost. Bras. 365. 1829. Not *Andropogon campestris* Kunth, 1830, nor Trin., 1832. *A. hypogynus genuinus* Hack. in Mart. Fl. Bras. 2 (3): 290. *pl.* 66. 1883. *A. hypogynus anatherus* Hack. in Mart. Fl. Bras. 2 (3): 290. *pl.* 66. 1883.

Open grassy plains; Izabal. Colombia; Brazil; Paraguay; northern Argentina.

Perennial; culms rather coarse, erect, 1–2 meters high; sheaths compressed, keeled, glabrous, the upper ones much shorter than the internodes; blades flat, 15–40 cm. long, 3–5 mm. wide, glabrous; racemes several, nearly straight, fascicled on a short axis, unequal, as much as 6 cm. long, the rachis joints and pedicels ciliate, the hairs inconspicuous; sessile spikelet 4 mm. long, bearded at the base, the first glume acute, somewhat concave, glabrous, the fertile lemma awnless or with a rather short straight awn; pedicellate spikelet larger than the sessile one, staminate, awnless, the first glume acuminate, rather strongly nerved.

Andropogon leucostachyus H.B.K. Nov. Gen. & Sp. 1: 187. 1816. *A. lanuginosus* H.B.K. Nov. Gen. & Sp. 1: 187. 1816. *Cola de venado* (Izabal).

Open fields, plains, banks, and pine ridges at low altitudes; Petén; Alta Verapaz; Izabal. British Honduras; southern Mexico and the West Indies to Argentina.

Slender perennial; culms in small dense tufts, erect, 25–70 cm. high, glabrous; sheaths narrow, compressed, glabrous, the lower ones crowded; ligule 1–1.5 mm. long, thin, truncate, minutely erose; blades 5–15 cm. long, or those on the innovations as much as 35 cm. long, 1–3 mm. wide, acute, scaberulous; flowering branches few, long and slender, sparingly branched; racemes paired, sometimes 3, exserted on long slender peduncles, the spathes rather long, but very narrow and inconspicuous; rachis and sterile pedicels slender but straight, densely villous, the spreading hairs commonly 10 mm. long; sessile spikelet 3 mm. long, glabrous, awnless; pedicellate spikelet wanting.

Andropogon malacostachyus Presl, Rel. Haenk. 1: 337. 1830. *Schizachyrium malacostachyum* Nash, N. Amer. Fl. 17: 102. 1912.

Rocky hills, 600–1,500 meters; Alta Verapaz; Guatemala. Mexico (Guerrero, type).

Annual; culms 8–35 cm. high, erect or geniculate at the lower nodes, scabrous, or strigose below the nodes, with short flowering branches from the upper nodes, sometimes from all the nodes; sheaths usually much shorter than the internodes, these sometimes elongate; ligule membranaceous, minutely ciliate, about 1 mm. long; blades 2–5 cm. long, 2–3 mm. wide, flat or usually folded, very scabrous on the margins; racemes solitary on the short branches, mostly shorter than the spathes, these becoming flat and rather conspicuous; rachis joints thickened upward, lunar in cross section, densely villous across the back, the sterile pedicel similar but narrower; sessile spikelet 7–8 mm. long, acuminate, minutely toothed, densely villous over the back, the callus densely bearded; fertile lemma awned from near the base, the awn about 1.5 cm. long, geniculate, tightly twisted below the bend, loosely twisted above; pedicellate spikelet narrow, 3 mm. long, with a straight awn about 5 mm. long.

Andropogon microstachyus Desv. ex Hamilt. Prodr. Pl. Ind. Occ. 8. 1825. *Pollinia microstachya* Desv. Opusc. 70. 1831.

Dry fields, open pine forests, and rocky or brushy slopes, up to 1,600 meters; Petén; Alta Verapaz; Huehuetenango; Chiquimula; Sacatepéquez; Chimaltenango. Southern Mexico and the West Indies to Argentina.

Rather coarse perennial; culms 1–1.5 meters high, erect, glabrous; sheaths mostly shorter than the internodes, sometimes overlapping, strongly compressed, keeled, glabrous or scaberulous; ligule firm, truncate, about 2 mm. long; blades 10–20 cm. or even 25 cm. long, 5–10 mm. wide, conduplicate or becoming flat, glabrous, the margins scaberulous; flowering branches numerous from the upper sheaths, ascending or appressed, forming a large, dense, feathery, corymbose, compound inflorescence; racemes solitary, 2–3 cm. long, partly included in the short inconspicuous spathes, the rachis strongly flexuous, the rachis joints and sterile pedicels long-villous on the sides; sessile spikelet 4 mm. long, narrow, acuminate, the callus shortly bearded, the delicate awn 8–12 mm. long, geniculate, tightly twisted below the bend, loosely twisted above; pedicellate spikelet rudimentary, awnless or with a short thread-like awn.

Andropogon saccharoides Swartz, Prodr. Veg. Ind. Occ. 26. 1788. *A. argenteus* DC. Cat. Hort. Monsp. 77. 1813. *A. laguroides* DC. Cat. Hort. Monsp. 78. 1813. *A. torreyanus* Steud. Nom. Bot. ed. 2. 1: 93. 1840. *Sorghum saccharoides* Kuntze, Rev. Gen. Pl. 2: 792. 1891. *Amphilophis saccharoides* Nash, N. Amer. Fl. 17: 125. 1912. *Bothriochloa saccharoides* Rydb. Brittonia 1: 81. 1931. Figure 2.

Prairies, meadows, pine forests, and roadsides, 1,000–1,800 meters; Quiché; Huehuetenango; Chimaltenango; Santa Rosa; Guatemala. Southwestern United States and the West Indies to Argentina.



FIG. 2. *Andropogon saccharoides*, $\times 1\frac{1}{3}$.

Tufted perennial; culms erect, brittle, 0.5–2 meters high, the nodes usually glabrous but sometimes some of them densely pubescent, but scarcely bearded; sheaths rounded on the back, glabrous; blades flat, acuminate, 10–20 cm. or even 30 cm. long in robust plants, 2–8 mm. wide, scabrous, papillose-hirsute near the base; panicles 5–15 cm. long, dense, white-silky, the usually numerous branches appressed or narrowly ascending; sessile spikelet 4 mm. long, the geniculate twisted awn mostly 1–1.5 cm. long; pedicellate spikelet as long as the sessile, but much narrower, awnless.

Andropogon selloanus (Hack.) Hack. Bull. Herb. Boiss. II. 4: 266. 1904. *A. leucostachyus selloanus* Hack. in DC. Monogr. Phan. 6: 420. 1889.

Pine woods and margins of swamps to about 1,300 meters; Petén; Huehuetenango; Chiquimula. British Honduras; Mexico (Chiapas); the West Indies and Panama to Argentina.

Densely tufted perennial resembling *A. leucostachyus*; culms erect, 45–100 cm. high, solitary or few in each tuft, glabrous; sheaths compressed, keeled, glabrous; ligule 0.5 mm. long; blades conduplicate, becoming flat, 3–5 mm. wide, those of the culm 5–8 cm. long, the uppermost much reduced or wanting, those of the innovations sometimes as much as 20 cm. long; flowering branches long and slender, solitary from the middle and upper sheaths, unbranched; racemes 3–5, exserted from the long and narrow but inconspicuous spathes, densely villous with tawny hairs more than 10 mm. long; sessile spikelet 3–4 mm. long, awnless, glabrous; pedicellate spikelet wanting.

Andropogon semiberbis (Nees) Kunth, Rev. Gram. Suppl. 1: 39. 1830. *Schizachyrium semiberbe* Nees, Agrost. Bras. 336. 1829.

Dry or rocky hills and plains; Chiquimula; Jalapa. British Honduras; Florida, eastern Mexico, and the West Indies to Ecuador and Argentina.

Very similar to *A. hirtiflorus*, differing primarily in the glabrous or scabrous first glume of the sessile spikelet, and the glabrous or only sparsely hairy rachis joints and sterile pedicels, the hairs confined to the margins near the summit; culms stouter, on the average, the blades rarely less than 4 mm. wide.

Andropogon semitectus Swallen, Contr. U. S. Nat. Herb. 29: 427. 1950.

Type from Baños de Santa María, Zacapa, Standley 73919. Mexico (Jalisco; Guerrero).

Annual; culms erect, 21–55 cm. high, glabrous, with flowering branches from the middle and upper nodes, all the internodes of about equal length; sheaths about half as long as the internodes, keeled, glabrous; ligule 0.5 mm. long, minutely ciliate; blades mostly 4–9 cm. long, 1.5–3 mm. wide, flat or folded, papillose-pilose on the upper surface toward the base with long hairs, the margins scabrous; spathes 2.5–3.5 cm. long; racemes solitary, mostly included, only the

uppermost spikelets exserted from the spathe, the peduncle very short; rachis joints and sterile pedicels broad but rather thin, lunate in cross section, densely villous on the lower part of the back, the upper part glabrous, the rachis joint somewhat widened at the summit with thin, almost wing-like margins, the tip cup-shaped; sessile spikelet 6 mm. long, narrow, the glumes acuminate, the first densely villous in the lower half; lemma 2.5 mm. long, awned, the awn inserted one-third from the base, 14 mm. long, tightly twisted below, geniculate, the twisted part dark brown, 6 mm. long; pedicellate spikelet greatly reduced, scabrous, bearing a slender straight scabrous awn 3-5 mm. long.

Andropogon tener (Nees) Kunth, Rev. Gram. 1: Suppl. 39. 1830. *Schizachyrium tenerum* Nees, Agrost. Bras. 336. 1829. *Andropogon gracilis* Presl, Rel. Haenk. 1: 336. 1830. Not *A. gracilis* Spreng., 1825. *A. preslii* Kunth, Rév. Gram. 1: Suppl. 39. 1830. *A. leptophyllus* Trin. Mém. Acad. St. Pétersb. VI. Math. Phys. Nat. 2: 264. 1832. *Sorghum tenerum* Kuntze, Rev. Gen. Pl. 2: 792. 1891.

Along roads; Huehuetenango. British Honduras (El Cayo District); southeastern United States; eastern Mexico; the West Indies; Panama to Argentina.

Densely tufted perennial; culms usually very slender, erect or reclining, 30-100 cm. long, glabrous; sheaths narrow, keeled, glabrous, the lower longer, the upper shorter than the internodes; ligule about 0.2 mm. long; blades commonly 5-10 cm. long, 1-3 mm. wide, flat or conduplicate, sometimes subinvolute, more or less curved or flexuous, sparsely papillose-hirsute near the base; flowering branches rather few and distant, slender, some of the racemes exserted on long slender peduncles; racemes slender, but straight, 2-5 cm. long, the rachis joints and sterile pedicels with a few long hairs on the sides near the summit, otherwise glabrous; sessile spikelet 5-6 mm. long, acute or acuminate, scabrous at least toward the tip, the callus rather densely bearded, the awn 7-12 mm. long, geniculate, tightly twisted below the bend; pedicellate spikelet as large as the sessile one, awnless.

Andropogon virgatus Desv. ex Hamilt. Prodr. Pl. Ind. Occ. 9. 1825. *Hypogynium spathiflorum* Nees, Agrost. Bras. 366. 1829. *Andropogon spathiflorus* Kunth, Rév. Gram. 1: Suppl. 40. 1830.

Marshy prairies and stream banks at low altitudes; Izabal. British Honduras (El Cayo District); Costa Rica; the West Indies; Panama to Bolivia and Argentina.

Perennial; culms relatively slender, tufted, commonly 1-1.5 meters high, erect, glabrous, usually tinged dull red or brownish; sheaths usually much shorter than the long internodes, compressed, keeled, glabrous; ligule membranaceous, 0.5 mm. long; blades elongate, especially those of the innovations, 2-5 mm. wide, conduplicate, becoming flat, the lower surface glabrous, the upper often more or less villous, the margins obscurely scabrous, sometimes ciliate near the base; inflorescence long and narrow, the slender, relatively short branches closely appressed, bearing numerous solitary racemes 1 cm. long, partly enclosed in small

reddish or purplish spathes; spikelets green, 3 mm. long, awnless, the pedicellate as large as the sessile one; first glume scabrous on the keels.

Andropogon virginicus L. Sp. Pl. 1046. 1753. *Cinna lateralis* Walt. Fl. Carol. 59. 1788. *Andropogon dissitiflorus* Michx. Fl. Bor. Amer. 1: 57. 1803. *Anatherum virginicum* Spreng. Pl. Pugill. 2: 16. 1815. *Andropogon vaginatus* Ell. Bot. S. C. and Ga. 1: 148. 1816. *A. tetrastachyus* Ell. Bot. S. C. and Ga. 1: 150. pl. 8, f. 4. 1816. *A. eriophorus* Scheele, Flora 27: 51. 1844. *A. louisianae* Steud. Syn. Pl. Glum. 383. 1854. *A. curtisianus* Steud. Syn. Pl. Glum. 1: 390. 1854. *Sorghum virginicum* Kuntze, Rev. Gen. Pl. 2: 792. 1891. Figure 3.

Pine woods; Jalapa; Quezaltenango; Huehuetenango. British Honduras; southern United States; the West Indies; Mexico (Veracruz); Costa Rica; Panama.

Densely tufted perennial; culms erect, 1-1.5 meters high, glabrous; lower leaves crowded in a dense basal cluster, the sheaths flattened, keeled, glabrous, or somewhat hirsute at the summit, the blades elongate, 2-4 mm. wide, the upper surface scabrous, more or less villous toward the base; culm sheaths much shorter than the internodes; ligule about 0.5 mm. long, minutely ciliate; flowering branches from the middle and upper nodes forming a loose inflorescence nearly half the length of the culms; racemes paired, slender, flexuous, partly enclosed in the broad conspicuous spathes, the rachis and sterile pedicels villous with long slender white hairs; sessile spikelet 3-4 mm. long, bearing a straight slender awn 10-15 mm. long; first glume acuminate, scabrous on the keels near the summit.

ANTHEPHORA Schreb.

Spikelets 1-flowered, in groups of 4, the first glumes many-nerved, indurate, thickened and united at the base, forming a false involucre around the spikelets, the groups short-pedicellate, falling entire; second glume 5-nerved, narrowed to a blunt tip; lemma ovate-acuminate, 3-nerved, firm but not indurate, the broad flat margins curved around and enclosing the palea.

Weedy annuals, in our species, with flat blades and terminal spikelike racemes.

Species five, four in Africa and one in tropical America.

Anthephora hermaphrodita (L.) Kuntze, Rev. Gen. Pl. 2: 759. 1891. *Tripsacum hermaphrodita* L. Syst. Nat. ed. 10. 2: 1261. 1759. *Anthephora elegans* Schreb. Besch. Gräs. 2: 105. pl. 44. 1810. *A. villosa* Spreng. Neu. Entd. 3: 14. 1822. *Cenchrus villosus* Spreng. Syst. Veg. 1: 301. 1825. Figure 4.

Open ground, roadsides, and waste places, sea level to about 2,000 meters; Izabal; Santa Rosa; Escuintla; Guatemala. British Honduras; the West Indies; Mexico to Peru and Brazil. A common weed in tropical America.



FIG. 3. *Andropogon virginicus*. Plant, $\times \frac{1}{2}$; spikelet with rachis joint and pedicel, $\times 5$.



FIG. 4. *Anthephora hermaphrodita*, $\times \frac{1}{2}$.

Annual; culms erect or decumbent at the base, branching, rooting at the lower nodes, 15–50 cm. high; sheaths glabrous or papillose-hirsute near the summit; ligule 2–3 mm. long, thin, brownish; blades 5–20 cm. long, 3–8 mm. wide, flat, acuminate, scabrous; racemes 5–10 cm. long, erect; first glumes 5–7 mm. long, broad, acute or acuminate, scabrous.

ARISTIDA L.

Spikelets 1-flowered, disarticulating above the glumes; glumes usually unequal, 1-nerved, or rarely 3-5-nerved, acuminate or awned; lemma indurate at maturity, terete, convolute around the palea, glabrous or scabrous toward the tip with a sharp, entire or minutely bifid, bearded callus; awns 3, the lateral sometimes very short or wanting, sometimes united at the base in a slender twisted column.

Densely tufted annuals or perennials with involute or narrow flat blades and open or contracted, occasionally spikelike panicles.

Species probably about 200, in warmer parts of both hemispheres.

Lateral awns wanting or very much reduced.

Awn (column) twisted at base. *A. schiedeana*.

Awn not twisted.

Plants annual; culms freely branching; panicles narrow, the short branches spikelet-bearing to the base; central awn curved or flexuous, the lateral ones wanting. *A. jorullensis*.

Plants perennial; culms simple; panicles open, diffuse, the long branches naked below; central awn straight, the lateral ones present but very much reduced. *A. ternipes*.

Lateral awns well developed, nearly as long as the central one.

Plants annual.

Column twisted, as long as the lemma; awns about 5 mm. long. . . *A. capillacea*.

Column wanting; awns 10-15 mm. long. *A. adscensionis*.

Plants perennial.

Panicles open, the branches spreading or drooping, naked below.

Summit of lemma with a twisted neck. *A. laxa*.

Summit of lemma not twisted.

Panicle branches drooping, loosely few-flowered at the ends.

A. longifolia.

Panicle branches stiffly spreading, rather densely flowered above the middle. *A. hamulosa*.

Panicles narrow, usually dense, the branches appressed or narrowly ascending.

Lemma narrowed above in a slender twisted column.

Column 3-5 cm. long; glumes long-awned. *A. implexa*.

Column short, not more than 5 mm. long; glumes awnless.

Panicles dense, interrupted; lemma 3.5-4 mm. long, much shorter than the glumes; awns loosely twisted below. *A. recurvata*.

Panicles narrow but loose; lemma 8-12 mm. long, about as long as the glumes; awns divergent, not twisted. *A. orizabensis*.

Lemma not twisted above, 5-7 mm. long. *A. purpurascens*.

Aristida adscensionis L. Sp. Pl. 82. 1753. *Chaetaria ascensionis*

Beauv. Ess. Agrost. 30, 151, 158. 1812. *Aristida bromoides* H.B.K.

Nov. Gen. & Sp. 1: 122. 1815. *A. coarctata* H.B.K. Nov. Gen. &

Sp. 1: 122. 1815. *Chaetaria bromoides* Roem. & Schult. Syst. Veg. 2: 396. 1817. Figure 5.

Fields and dry open ground, up to 1,500 meters; Alta Verapaz; El Progreso; Zacapa; Guatemala. Southwestern United States and



FIG. 5. *Aristida adscensionis*, $\times 1$.

the West Indies to Chile and Argentina; warmer parts of the Old World.

Annual; culms freely branching, erect or geniculate ascending, glabrous, 10–80 cm. tall; sheaths glabrous; blades as much as 10 cm. long, 2 mm. wide, flat or often short and involute, scabrous above; panicles mostly 5–15 cm. long, dense or often loose and drooping; glumes 1-nerved, the first 5–7 mm. long, obtuse or subacute, the second 8–10 mm. long, acute or blunt; lemma 6–9 mm. long, scabrous on the keel above, the callus subobtuse, densely short-pilose; awns 10–15 mm. long, subequal, equally divergent, flat at the base, gradually narrowed to a fine point.

Aristida capillacea Lam. Tabl. Encycl. 1: 156. 1791. *A. elegans* Rudge, Pl. Guian. 22. pl. 30. 1805. *Chaetaria capillacea* Beauv. Ess. Agrost. 30, 158. pl. 8, f. 6. 1812. *Aristida sanctae-luciae* Trin. Gram. Pan. 25. 1826. *Chaetaria capillaris* Nees, Agrost. Bras. 388. 1829.

Pine forests, about 1,500 meters; Chiquimula. British Honduras; southern Mexico; Honduras; Costa Rica; Panama; Colombia to Bolivia and Brazil.

Delicate annual; culms 5–25 cm. high, erect, freely branching; blades 1–5 cm. long, less than 1 mm. wide, scabrous on the margins, often sparsely pilose with long white hairs; panicles 2–8 cm. long, usually tinged with purple, the capillary branches ascending or spreading, more or less flexuous, naked below, not more than 2 cm. long; glumes narrow, acuminate, the first 2–2.5 mm. long, the second 2.5–3 mm. long, sometimes subequal; lemma 2 mm. long, tapering into a slender twisted column 1.5–2 mm. long; awns about 5 mm. long, divergent.

Aristida hamulosa Henr. Med. Rijks Herb. Leiden 54: 219. 1926.

Dry hills and scrub oak forests, 1,400–1,600 meters; Jalapa; Guatemala. Southwestern United States; Mexico.

Perennial; culms rather slender, erect, 40–70 cm. or even as much as 1 meter tall; sheaths glabrous or scaberulous, all longer than the internodes; blades as much as 30 cm. long, less than 3 mm. wide, flat or becoming involute, glabrous beneath, finely scabrous above; panicles commonly 25–40 cm. long, sometimes three-fourths the height of the plant, the branches stiffly spreading, more or less drooping, naked in the lower half, the lower ones as much as 20 cm. long; spikelets appressed; glumes 12–15 mm. long, subequal, acuminate; lemma about 12 mm. long, usually strongly scabrous, not twisted, the central awn 1.5–2.5 cm. long, the lateral ones shorter, somewhat divergent.

Aristida implexa Trin. Mém. Acad. St. Pétersb. VI. Sci. Nat. 2, no. 1: 48. 1836.

Abundant in sandy pine uplands, San Augustin, Mountain Pine Ridge, El Cayo District, British Honduras, *Lundell* 6904. El Salvador; Brazil.

Perennial; culms caespitose, erect, as much as 1 meter high, glabrous; sheaths glabrous, the lower ones crowded; blades elongate, attenuate, flexuous, flat at the base, 2–3 mm. wide, glabrous beneath, finely scabrous above, the lower ones becoming curled with age; panicles dense, spikelike, 10–25 cm. long, the short branches appressed; glumes subequal, about 1 cm. long, strongly scabrous, awned, the awns 5–10 mm. long; lemma 5–6 mm. long, the twisted neck 3–5 cm. long, the awns divergent, 2–4 cm. long.

Aristida jorullensis Kunth, Rev. Gram. 1: 62. 1829. *Strep-tachne pilosa* H.B.K. Nov. Gen. & Sp. 1: 124. 1815. Not *Aristida pilosa* Labill., 1824. *Ortachne pilosa* Nees, Seem. Bot. Voy. Herald 225. 1854. *Aristida manzanilloana* Vasey, Contr. U. S. Nat. Herb. 1: 282. 1893.

Deserts and rocky slopes at low altitudes; Zacapa; Jutiapa. Mexico to Panama.

Erect annual in small tufts; culms 10–45 cm. high, rarely more, slender, freely branching from all the nodes; blades mostly less than 10 cm. long, 1–2 mm. wide,

flat or becoming involute, tapering to a fine point, scabrous on the upper surface and bearing scattered long white hairs; panicles 5–20 cm. long, finally long exerted, the short, stiff, rather distant, ascending to spreading branches floriferous to the base, bearing scattered long fine hairs; glumes narrow, acuminate, subequal, 5–7 mm. long, glabrous; lemma gradually narrowed into a curved or flexuous awn, the lemma and awn together 15–35 mm. long, the division indistinct, the lateral awns wanting.

Aristida laxa Cav. Icon. Pl. 5: 44. *pl.* 470, *f.* i. 1799. *A. spadicea* H.B.K. Nov. Gen. & Sp. 1: 123. 1815. *Chaetaria spadicea* Roem. & Schult. Syst. Veg. 2: 397. 1817. *Aristida lagascae* Henr. Med. Rijks Herb. Leiden 54: 281. 1927.

This species has been credited to British Honduras by A. S. Hitchcock (Contr. U. S. Nat. Herb. 24: 601. 1930) but no specimen has been observed by the author. Mexico; Honduras; Nicaragua; Colombia; Ecuador.

Resembling *A. hamulosa*, but the panicles larger with long drooping branches, and the summit of the lemma with a twisted neck 3–5 mm. long.

Aristida longifolia Trin. Mém. Acad. St. Pétersb. VI. Math. Phys. Nat. 1: 84. 1830.

Wet sand at edge of stream; Río On, Mountain Pine Ridge, El Cayo District, British Honduras, *Lundell* 6801. Northeastern Brazil.

Perennial; culms tufted, about 60 cm. high, erect; sheaths compressed, glabrous, the lower ones crowded; blades elongate, 2–3 mm. wide, attenuate, firm, strongly nerved, glabrous beneath, scabrous and sometimes sparsely pilose above; panicle more than half the length of the culm, the distant branches ascending or spreading, bearing a few appressed spikelets toward the ends; glumes 10–12 mm. long, acuminate, subequal or the second a little longer than the first; lemma about 10 mm. long, the central awn 2–3 cm. long, the lateral half to two-thirds as long, suberect, scabrous.

Aristida orizabensis Fourn. Mex. Pl. 2: 78. 1886. *A. pseudo-spadicea* Hubb. Proc. Amer. Acad. 49: 500. 1913. *A. orizabensis* var. *pseudospadicea* Henr. Med. Rijks Herb. Leiden 54B: 473. 1928.

Oak and pine forests, brushy rocky slopes, and dry places, 850–2,200 meters; Jalapa; Jutiapa; Guatemala; Chimaltenango; Huehuetenango. British Honduras; Mexico; El Salvador; Honduras; Costa Rica; Panama.

Perennial; culms slender, 50 cm. to more than 1 meter high, smaller in depauperate plants, glabrous; blades 10–30 cm. long, 1–3 mm. wide, scabrous on the upper surface, flat at the base, becoming involute pointed, the older ones at the base of the plant finally flattened and coiled; panicles 15–30 cm. long, the branches

distant, the upper ones appressed, the lower ones often spreading, somewhat flexuous, usually less than 8 cm. long; spikelets appressed to the branches; glumes 8–10 mm. long, narrow, acuminate, awn-pointed, the second a little longer than the first; lemma 8–12 mm. long with a slender twisted beak about 3 mm. long; awns 1–2.5 cm. long, about equally divergent, the central a little longer than the lateral ones.

Aristida purpurascens Poir. in Lam. Encycl. Suppl. 1: 452. 1810. *Chaetaria purpurascens* Beauv. Ess. Agrost. 30, 152, 158. 1812.

Common in sandy pinelands, British Honduras. Not known from Guatemala. Southeastern United States.

Perennial; culms mostly 40–70 cm. high, erect, the base slender and rather weak; sheaths somewhat compressed, glabrous or nearly so, especially the lower ones overlapping; blades usually 10–20 cm. long, less than 2 mm. wide, flat, more or less flexuous, scabrous above with a few hairs toward the base; panicles narrow, rather lax, as much as half the length of the culm, the branches appressed, usually 1–2 cm. long; glumes subequal, 5–8 mm. long, rarely longer, usually mucronate; lemma 5–7 mm. long, the body glabrous, the callus slightly pubescent; awns equal or the central a little longer, 1.5–2.5 cm. long, equally divergent, horizontally spreading or somewhat reflexed, more or less contorted toward the base.

Aristida recurvata H.B.K. Nov. Gen. & Sp. 1: 123. 1815. *Chaetaria recurvata* Roem. & Schult. Syst. Veg. 2: 397. 1817. *Aristida neesiana* Trin. & Rupr. Mém. Acad. St. Pétersb. VI. Sci. Nat. 5 (1): 113. 1842. *A. riedeliana* Trin. & Rupr. Mém. Acad. St. Pétersb. VI. Sci. Nat. 5 (1): 114. 1842.

Along Río Privación, Mountain Pine Ridge, El Cayo District, British Honduras. Not known from Guatemala. Panama; Colombia; Venezuela; British Guiana; Peru; Brazil.

Densely tufted perennial with numerous old blades flattened and coiled at the base of the plants; culms 60–100 cm. high, relatively slender, glabrous, or scabrous below the panicle; sheaths longer than the internodes, glabrous; blades 15–30 cm. long, 1–3 mm. wide, tapering to a long involute point, glabrous beneath, scaberulous above, with thickened scabrous margins; panicles 10–30 cm. long, narrow, dense, somewhat interrupted, the branches ascending or appressed, re-branching from near the base, the branchlets appressed and dense, giving the panicle a lobed appearance, the lower internodes as much as 3 cm. long, the upper ones gradually shortened; glumes 8–10 mm. long, narrow, acuminate or awn-pointed, the first very scabrous; lemma 3.5–4 mm. long, glabrous, the slender slightly twisted column 2–3 mm. long, the callus blunt, densely pubescent, about 0.4 mm. long; awns 10–12 mm. rarely 15 mm. long, the central slightly longer than the lateral ones, all loosely twisted together at the base, divergent.

Aristida schiedeana Trin. & Rupr. Mém. Acad. St. Pétersb. VI. Sci. Nat. 5 (1): 120. 1842.

Grassy or brushy slopes, pine and pine-oak forests, sometimes in cultivated ground, 1,000–2,000 meters; Zacapa; Jalapa; Guatemala; Sacatepéquez; Huehuetenango. Mexico.

Culms tufted, erect, 30–80 cm. high, several-noded; sheaths much longer than the internodes, glabrous, or rather conspicuously villous on the collar; blades firm, elongate, attenuate, as much as 3 mm. wide, the lower ones becoming curled with age; panicles open, as much as 30 cm. long, the branches solitary or in pairs, distant, spreading, naked at the base; glumes subequal, 8–10 mm. or as much as 15 mm. long; lemma narrowed into a slender twisted column, 10–15 mm. long including the column; central awn 5–10 mm. long, divergent, the lateral ones minute or obsolete.



FIG. 6. *Aristida ternipes*, $\times 1$.

Aristida ternipes Cav. Icon. Pl. 5: 46. 1799. *Streptachne scabra* H.B.K. Nov. Gen. & Sp. 1: 124. pl. 40. 1815. *S. tenuis* H.B.K. Nov. Gen. & Sp. 1: 124. 1815. *Aristida scabra* Kunth, Rev. Gram. 1: 62. 1829. *Ortachne scabra* Fourn. Bull. Soc. Bot. France 27: 295. 1880. Figure 6.

Hills, thickets, and brushy fields, up to 1,200 meters; Zacapa; Jutiapa; Santa Rosa; Guatemala. British Honduras; southwestern United States to Colombia; Cuba; Bahamas.

Perennial; culms in small tufts, erect, 50–150 cm. high; blades flat, elongate, flexuous, involute toward the tip, tapering into a fine point; panicles large, diffuse, drooping, one-third to one-half the length of the culm, the branches relatively

stout, scabrous, naked below; spikelets appressed toward the ends of the branches; glumes 8–10 mm. long; lemma 15–18 mm. long, including the flattened and tapering summit, scabrous on the keel, the central awn subterete, straight or arcuate, 10–15 mm. long, the lateral awns usually less than 1 mm. long.

ARTHRAXON Beauv.

Perfect spikelets sessile, the secondary spikelet and its pedicel wanting or rarely present at the lower joints of the articulate rachis; fertile lemma entire or minutely bidentate, awned from the back above the base.

Slender annuals with cordate blades and few paniculate racemes.

Species about 20, in the tropics of the Old World; introduced in America.



FIG. 7. *Arthraxon quartinianus*, $\times \frac{1}{2}$.

Arthraxon quartinianus (A. Rich.) Nash, N. Amer. Fl. 17: 99. 1912. *Arthraxon ciliaris* subsp. *quartinianus* Hack. in D.C. Monog. Phan. 6: 356. 1889. Figure 7.

Moist thickets and banks, Huehuetenango; Quezaltenango. Mexico (Chiapas). West Indies. Introduced from the tropics of the Old World.

Annual; culms very slender, creeping, freely branching; sheaths much shorter than the internodes, papillose or papillose-pilose especially toward the summit; blades ovate, subcordate, 1-4 cm. long, 4-12 mm. wide, sparsely hispid with long hairs; racemes 1-3 on very slender peduncles, mostly 1-2 cm. long; spikelets 3 mm. long, pale or usually purplish, acute, hispid near the tip, the awn 3-5 mm. long.

ARTHROSTYLIDIUM Rupr.

Caespitose, unarmed bamboos with determinate rhizomes and erect or climbing, often apically pendulous culms; the branches either numerous, slender and subequal or few and very unequal, the central one at each node then strongly dominant and flanked by one to several pairs of progressively shorter and more slender ones; the culm sheaths sooner or later deciduous in most species; leaf blades typically without conspicuous transverse veins. Inflorescences spicate, racemose or paniculate, the spikelets several-many-flowered, usually readily disarticulating when mature; empty glumes 1-several; lodicules typically 3; stamens 3; style 1, sometimes divided almost to the base, stigmas usually 2; fruit a caryopsis.

About 35 species have been named; all are native to tropical America. As a rule, they are of no great economic importance. Three clearly distinct species have been found in Guatemala.

Branches few at each culm node, unequal; spikelets distant. *A. excelsum*.

Branches numerous at each culm node, slender, subequal; spikelets approximate.

Spikelets conspicuously flattened, not crowded, lemma tightly amplexant, mucronate. *A. bartlettii*.

Spikelets not conspicuously flattened, somewhat crowded, lemmas loosely amplexant, aristate. *A. pittieri*.

Arthrostylidium bartlettii McClure, Phytologia 5: 81-82. 1954.

Known only from the type (*Bartlett* 12154) from the "jungle near a dry arroyo at Uaxactún," and one other collection from the vicinity of La Libertad, Petén. The recorded data are very meager.

Culms of unknown height, the upper internodes to 29 cm. \times 3 mm., thin-walled, glabrous; nodes scarcely inflated; culm sheaths deciduous (lacking in the type); branches numerous, very slender, subequal, rebranched with solitary twigs at basal nodes and occasionally at the upper ones, 5-35 cm. long; leaf sheaths

very slender, compressed-keeled and with nerves salient below the insertion of the petiole, puberulent here and there along the ciliate margins, otherwise glabrous or nearly so; auricles lacking; oral setae lacking, or few and weakly developed, glabrous; petiole collar only slightly flared, the margin arcuate, entire; ligule short, not exceeding 1 mm., the apex usually convex, the margin ciliate; petiole very short (2–3 mm.), slender, scabrous on the upper surface, glabrous or nearly so on the lower surface, dark brown and very brittle when dry; leaf blades 20–120 \times 2–9 mm., lanceolate to oblong-lanceolate, acute, rounded at the base, pliculate, scabrous throughout on the upper surface, lightly glaucous except along one edge on the lower surface, hirsute on one side at the base only, otherwise glabrous or weakly asperous on the lower surface, the midrib and primary veins scarcely discernible on the upper surface, weakly so on the lower surface.

Inflorescences subspicate racemes terminating leafy or leafless branches of first or second order, exserted 5–16 cm., the main axis glabrous; spikelets somewhat flattened, 15–20 mm. long, subsessile, the pedicels about 1 mm. long, appressed, about 10 mm. apart on the rachis; empty glumes 2 or 3, glabrous, keeled, mucronate or more commonly scabro-aristate, I: narrowly triangular, 2.5–3 mm. long, 1–3 nerved, II: triangular, acute, 3–5 mm. long, 3–5 nerved, III: lanceolate, acute, 5–6 mm. long, 5–7 nerved; florets 1.5–3.5, somewhat flattened and slightly divergent, the lowest one sometimes incomplete, the uppermost always tabescent; rachilla segments one-half to two-thirds as long as the palea, slender, abruptly flared at the cupulate apex, glabrous (the uppermost one scabrous) below, the cupule white-strigose with ciliate margin; lemmas thin, pale, stramineous, about 5–9-nerved, lanceolate, acute, scabro-mucronate, ciliate along the margins above, otherwise glabrous, I: about 6 mm. long, sometimes sterile, II and III: 8–10 mm. long; palea generally exserted 1–3 mm., commonly tinted with wine, ciliate at the apex and on the keels near the apex, otherwise glabrous; lodicules 3, similar, about 1 mm. long, lanceolate, acute, hyaline, with inconspicuous nerves, sparsely ciliate at the apex; anthers greenish yellow, about 5 mm. long; ovary slender subfusiform, glabrous, pale brown, about 1.5 mm. long, passing above into a white, glabrous style crowned by 2 plumose stigmas. Fruit not seen.

Arthrostyloidium excelsum Griseb., Fl. Brit. W. Ind. 529. 1864.

Plant of dense, wet forests at elevations of 1,500–1,600 meters; Alta Verapaz; Zacapa. Dominican Republic (whence the type).

"Small, slender vine" (Standley), "shrubby" (Steyermark). Culms (not present in the type; described from *Steyermark* 42626) forming caespitose clumps, slender, to 2.5 mm. in diameter at the base, stiff, the internodes glabrous, shining (III: up to 93 mm. \times 2 mm.); nodes slightly swollen, all gemmiferous. Culm sheaths apparently more or less persistent (represented in *Steyermark* 42626 by decaying fragments). Branches solitary or the principal one flanked by usually two smaller ones, the principal one to 45 cm. long, appressed to ascending, the internodes elongate (to 12 cm. \times 1–1.5 mm.), glabrous, glossy, the nodes somewhat inflated. Leaf sheaths lightly compressed-keeled, salient-nerved, glabrous or nearly so dorsally and on the margins; auricles lacking; oral setae few to several, approximate, parallel, antrorse-erect throughout or the tips bent back, glabrous, persistent, at first chestnut brown gradually fading to stramineous; petiole collar

only slightly flared, the apex straight to faintly emarginate, the margin entire or nearly so; leaf blades 7.5 cm. \times 11 mm. to 15 cm. \times 23 mm., lanceolate to linear-lanceolate, acuminate, often apiculate, rounded to cuneate-rounded at the base, white strigose at the base and above this antrorse-scabrous near the outer margin on the upper surface, microscopically papillose between the nerves on the lower surface, otherwise glabrous or nearly so on both surfaces, sometimes antrorse-scabrous on the lower surface near the apex, often plicatulate, the midrib and nerves inconspicuous on both surfaces.

Inflorescence a slender raceme terminal to leafy branches or leafless, appressed twigs, exerted 15–20 cm., the stiff, sulcate axis nearly straight throughout or zigzag above (geniculate at the point of insertion of each of the penultimate 2–3 pedicels), entirely glabrous; spikelets distant, subsessile, appressed or divaricate, flattened, somewhat lax; pedicels about 1 mm. long, appressed, glabrous, 10–25 mm. apart; empty glumes usually 3, stramineous, glabrous, few-nerved, mucronate or submucronate, I: about 4 mm., II: about 5 mm., III: about 6 mm. long; rachilla segments strongly compressed, sulcate-striate when dry, flaring to the cupulate apex, obscurely ciliolate on the margin of the cupule, otherwise glabrous, the lower ones two-fifths, the upper ones two-thirds as long as the lemma; florets usually 5–6, the uppermost tabescent; lemmas 8–10 mm. long, nerve-keeled toward the acute, submucronate tip, with a strong tendency to roll inward along the margins, greenish stramineous often touched with wine, and showing about 11 colorless veins, glabrous or obscurely strigose throughout, or more commonly coarsely so only along the margins near the base on the outside, white sericeous toward the apex on the inner surface; palea not at all or only slightly exerted, the keels ciliolate toward the truncate, densely ciliate apex, sometimes sparsely sericeous toward the apex between the keels, otherwise glabrous throughout, weakly veined, the margins thick and gaping below, membranaceous and slightly overlapped above; lodicules 2 and subequal or 3 and very unequal, 1.5–2 mm. long, narrowly triangular to lanceolate to oblong, acute to acuminate to abruptly acuminate, thickish and soft, brown, opaque, minutely ciliolate on the margins, otherwise glabrous; anthers not seen; ovary 1 mm. long, linear, glabrous, crowned by a slender, white, glabrous style about 1 mm. long, divided at the top into two irregularly branched stigmas; fruit not seen.

***Arthrostylidium pittieri* Hack.** Oesterr. Bot. Zeitschr. 53: 75. 1903.

Plant with apparent preference for shade and moist atmosphere, found in forests, in deep ravines and on wet cliffs; Santa Rosa; Jalapa. Costa Rica (whence the type) and Panama.

The following description is based on specimens from Guatemala matched with material from the type collection.

Densely caespitose plant with apically scandent culms 5–8 meters tall and 1–2 cm. in diameter, the internodes elongate, thin-walled, glabrous, not sulcate above the insertion of the branches, the nodes not inflated; culm sheaths deciduous, unknown; branches very numerous, all slender, up to 50 cm. long, rebranched with usually solitary twigs at basal and (more rarely) other nodes; leaf sheaths short, narrow, with somewhat salient veins, ciliolate on the margins, otherwise

glabrous, or roughish between the veins; auricles not at all developed; oral setae absent or few; petiole collar scarcely flared, the apex straight, the margin glabrous; ligule up to 1.5 mm. long, broadly convex at the apex, sparsely ciliolate on the margin, dorsally glabrous; petiole 2-3 mm. long, glabrous on both surfaces, very brittle when dry; leaf blade up to 120×18 mm., lanceolate, acute above, broadly rounded to cuneate at the base, midrib salient at the base, otherwise scarcely distinguishable from the very obscure secondary veins; inflorescences mostly secund, spicate racemes, terminal to leafy or (rarely) leafless branches, exserted 6-15 cm., the axis slender, glabrous; pedicels about 1 mm. long, inserted about 5 mm. apart, appressed; spikelets pale stramineous, imbricate, usually bearing 2 or 3 functional florets, the terminal floret tabescent; rachilla segments often tardily disarticulating; empty glumes 3 or 2, glabrous, I (sometimes lacking): subulate, 2-3 mm. long, 1-nerved, II: 4-5 mm. long, ovate-acuminate, 3-5-nerved, mucronate or aristate, III: 5-8 mm. long, keeled ovate-lanceolate, or aristate, 5-7-nerved; lemmas lanceolate, acuminate, aristate, 10-15 mm. long, 5-7-nerved, glabrous or nearly so on the back, the margins conspicuously ciliate below the scabrous awn; paleas exserted, ciliate on the keels near the apex; lodicules 2; stamens not seen; ovary linear, about 1 mm. long, glabrous; style 1, stigmas 3; mature fruit unknown.

The mature culms of a bamboo of this genus called "*carrizo*" are used in the vicinity of Lake Atitlán for finishing the walls and partitions of peasant homes. The whole, unsplit culms are fastened in close order to the horizontal members of the frame by means of bark lashings. Within the household, the long hollow internodes are used to make flutes, and fire-blowing tubes (*fuquneras*), a simple substitute for the bellows, useful in starting or reviving fires.

ARUNDINARIA Michx.

Dumetose bamboos with indeterminate, cylindrical rhizomes and erect culms, the culm sheaths persistent or deciduous, the branches solitary or, when fasciated, the central one at each node strongly dominant and flanked by one or more pairs of progressively shorter and more slender ones, the leaf blades with conspicuously and regularly tessellate venation. Inflorescences racemose or paniculate, the spikelets several- to many-flowered; lodicules 3; stamens 3; style solitary, the stigmas usually 3; fruit a caryopsis.

Probably upward of one hundred species, found principally in southeastern Asia and adjacent islands, Japan to Madagascar, have been assigned to this genus. Two of doubtful generic affinity have been described from Africa. The greatest concentration of species of *Arundinaria* is found in Japan, where apparently a good deal of natural hybridization has taken place. Two species, including the type of the genus, and several varieties, have been described from southeastern United States. The bamboos native of the Western Hemisphere outside of the United States that have been placed in this genus apparently belong elsewhere.

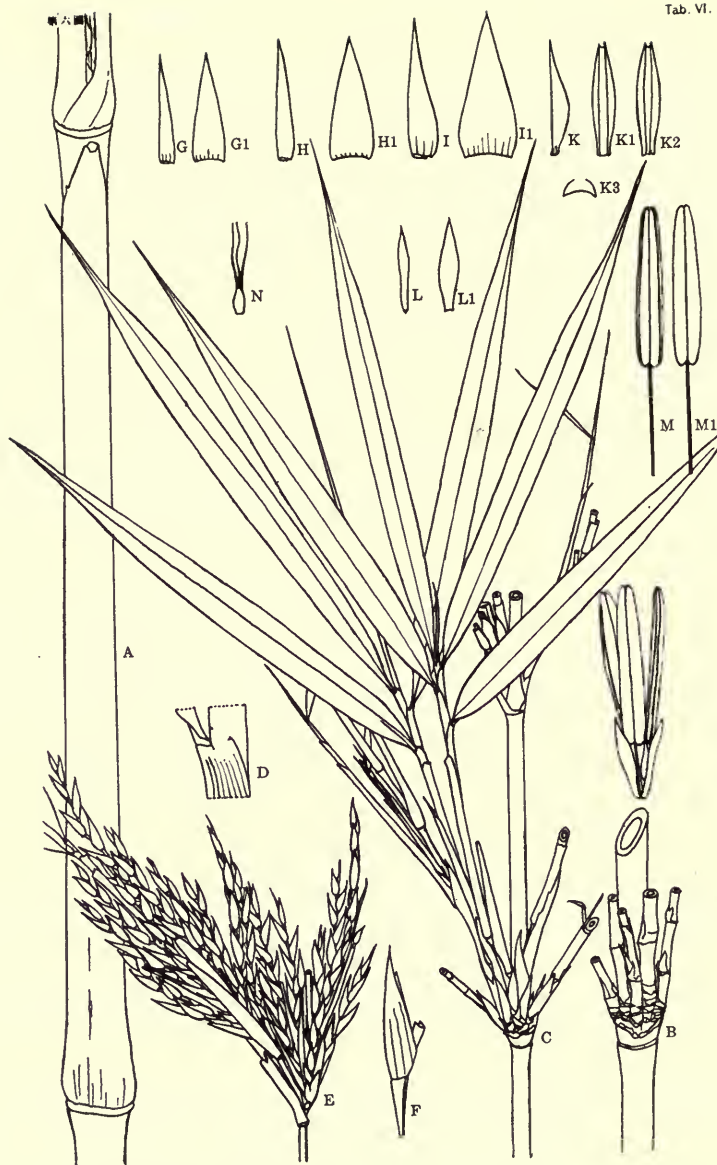


FIG. 8. *Arundinaria simonii* (Carr.) A. and C. Riv. A, portion of culm, bearing persistent sheath from which the blade has fallen away, $\times \frac{1}{2}$; B, mid-culm branch complement, $\times \frac{1}{2}$; C, upper-culm branch complement with leaves, $\times \frac{1}{2}$; D, junction of leaf sheath and petiole of leaf blade, showing ligule and oral setae, $\times 2.5$; E, portion of inflorescence, $\times \frac{1}{2}$; F, floret, with two segments of the rachilla, $\times 1\frac{1}{2}$; G, G1, lower empty glume, $\times 1\frac{1}{2}$; H, H1, upper empty glume, $\times 1\frac{1}{2}$; I, I1, lemma, $\times 1\frac{1}{2}$; K, K1, K2, K3, palea, $\times 1\frac{1}{2}$; L, L1, lodicules, $\times 3$; M, M1, stamen, $\times 3$; N, pistil, $\times 3$. From Nakai, *Flora Sylvatica Koreana*, Part xx, pl. vi. 1933.

The genus is represented in Guatemala by two introduced species.

Branches solitary or nearly so; auricles and oral setae well developed on both culm sheaths and leaf sheaths, the oral setae dark, scabrous; leaf blades broad.

A. longiaurita.

Branches fascicled; auricles and oral setae lacking entirely on culm sheaths, oral setae lacking or weakly developed on leaf sheaths, pale, glabrous; leaf blades narrow *A. simonii.*

Arundinaria longiaurita Hand.-Mzt. Symb. Sin. 7 (5): 1271.

1936. *Indocalamus longiauritus* Hand.-Mzt. Anz. Akad. Wiss. Math. Naturw. (Wien) 62: 254. 1926.

A Chinese species introduced into the Western Hemisphere by the United States Department of Agriculture. Plants from this source were introduced into Guatemala by Dr. Wilson Popenoe and established at Sr. Pedro Cofiño's plantation, Finca Pintado (elev. about 1,547 meters), near Antigua, Suchitepéquez. The following description is based on the plant as it was found growing at Finca Pintado, in May, 1948 (*McClure* no. 21655).

A small bamboo, with slender, wide-ranging rhizomes, and stiff culms up to about 1 meter tall and 3-6 mm. in diameter; internodes up to 15 cm. long, thick-walled, pale fawn velutinous for some distance below the nodes, gradually glabrescent; nodes flaring abruptly at the sheath scar and appreciably inflated above it, particularly when geniculate. Culm sheaths persistent, striate with salient nerves, glabrous on the back, prominently ciliate on the upper margins; oral setae strongly developed, delicate, fugaceous, long, slender, falcate, bearing numerous long, spreading, dark, scabrous, oral setae; ligule very short, long-fimbriate on the margin with coarse, scabrous bristles; sheath blades lanceolate, appressed to the culm at first, later usually more or less strongly reflexed, salient-veined, glabrous or nearly so on both surfaces, usually abscissile at length. Branches short, appressed, mostly solitary, sometimes once-branched at the basal and other nodes. Leaf sheaths coarse, closely imbricate, salient-veined, glabrous or fawn velutinous on the back, ciliate on the outer margin, fringed at the base with a dense band of spreading brown hairs, furnished on one or each shoulder with a long, delicate, falcate, spreading, fugacious, setiferous auricle or furnished on one shoulder with numerous strong, appressed scabrous bristles alone instead of an auricle; petiole collar up to about 1 mm. long, thin, densely ciliate along the irregular margin; ligule very short, not exerted, fringed on the margin with numerous, close-set cilia; petiole long, thick, glabrous or glabrescent; leaf blades lanceolate or oblong-lanceolate, acuminate above, broadly or cuneately rounded at the base, glabrous or nearly so on both surfaces, midrib and primary veins salient on the lower surface, often more or less depressed on the upper surface.

In its native habitat, this bamboo produces culms up to 4 meters tall and 15 mm. in diameter, with very long, straight, thick-walled internodes which find many uses locally. The leaves of such plants are very large (up to 30 or 35 cm. long and 7 or 8 cm. broad) and are

much used locally for lining (rain-proofing) bamboo hats and the awning of boats.

Arundinaria simonii (Carr.) A. & C. Riv. Bull. Soc. Acclim. III: 5: 774. 1878. *Pleioblastus simoni* (Carr.) Nakai, Jour. Arn. Arb. 6: 147. 1925. Figure 8.

A Japanese bamboo introduced into Europe nearly a hundred years ago, and from that source it reached the Western Hemisphere through the agency of the United States Department of Agriculture, which sent plants to the Instituto Agropecuario Nacional for trial in Guatemala. The plants were established at Labor Ovalle, Quezaltenango, but have been hindered in their development by the severity of the dry seasons in that area. The species is variable in stature, and horizontal forms with narrower leaves, often striped with white, and with reduced stature occur. This bamboo, in its various forms, is generally considered solely as an ornamental, but the larger form produces culms that have been used as fishing poles, and for making the handles of shuffle-board sticks (in Florida). They make satisfactory garden stakes, though for this purpose they do not last well.

The following description is based in part on that of the *Rivieres (op. cit.)*:

A dumetose bamboo with slowly spreading, slender rhizomes and stiffly upright culms reaching a height of 6 to 8 meters and a diameter of 2 cm.; internodes glabrous, shining, with fine, faintly salient ridges, reaching a midculm length of 40 to 45 cm., hollow, the lumen lined with a white pith; the nodes somewhat inflated. Culm sheaths persistent, striate with salient veins, glabrous on the back, ciliate on the margins; auricles and oral setae usually lacking entirely; ligule truncate, up to 3 or 4 mm. long, ciliolate on the margin; sheath blade linear-lanceolate, arch-reflexed, glabrous or nearly so on both surfaces. Branches short, fasciculate, appressed at the base, then spreading, usually suppressed in the lower part of the culm in large plants. Leaf sheaths slender, strongly imbricate, lightly striate with salient veins, glabrous; auricles only slightly or not at all developed; oral setae few, small, pale, glabrous; ligule well developed, truncate or slightly convex at the apex, glabrous or minutely ciliolate on the margin; petiole slender, glabrous; leaf blade linear-lanceolate, acuminate, cuneate at the base, glabrous on the upper surface, lightly glaucous and glabrous or nearly so on the lower surface, the midrib and primary veins salient on the lower surface, scarcely so on the upper surface.

ARUNDINELLA Raddi

Spikelets short-pedicelcd in rather dense contracted panicles; glumes acuminate, the first 3-5-nerved, the second 5-nerved, much longer than the first; sterile lemma acute, 3-5-nerved, a little shorter to a little longer than the first glume, containing a well developed palea; fertile floret much shorter than the sterile lemma, with a short bearded callus and a terminal geniculate awn.

Slender to coarse perennials with narrow blades and small to larger contracted panicles.

Species about 45, in the tropics of Asia and America.

Awns 2–5 mm. long, tightly twisted below the bend *A. confinis*.

Awns 8–12 mm. long, not twisted.

Culms coarse, 1–2.5 meters high; sheaths densely papillose-hispid.

A. deppeana.

Culms slender, 30–60 cm. high; sheaths glabrous *A. berteroniana*.

Arundinella berteroniana (Schult.) Hitchc. & Chase, Contr. U. S. Nat. Herb. 18: 290. 1917. *Trichochloa berteroniana* Schult. Mant. 2: 209. 1824. *Arundinella peruviana* Steud. Syn. Pl. Glum. 1: 115. 1854. *A. cubensis* Griseb. Mem. Amer. Acad. (n. s.) 8: 533. 1862.

Damp thickets, open banks, among rocks along streams, up to 1,500 meters; Alta Verapaz; Chiquimula; Jalapa; Quezaltenango; Retalhuleu; San Marcos. British Honduras; West Indies; Mexico to Brazil.

Slender perennial; culms densely tufted, erect, 30–60 cm. or sometimes as much as 1 meter high, glabrous, the nodes appressed-pubescent; sheaths glabrous, sparsely hispid in the throat and on the collar, the margins glabrous or ciliate; ligule ciliate, very short; blades commonly 10–20 cm. long, 2–5 mm. wide, flat or sometimes involute, papillose or papillose-hispid; panicles 10–30 cm. long, rather lax, the ascending branches not densely flowered, floriferous to the base; spikelets 4–5 mm. long, the slender awn of the fertile floret 8–12 mm. long, not twisted below, geniculate, the terminal portion spreading or reflexed.

Arundinella confinis (Schult.) Hitchc. & Chase, Contr. U. S. Nat. Herb. 18: 290. 1917. *Piptatherum confine* Schult. Mant. 2: 184. 1824. *Arundinella martinicensis* Trin. Gram. Pan. 62. 1826. *A. pallida* Nees, Agrost. Bras. 465. 1829. Figure 9.

Prairies and dry slopes at low altitudes; Izabal; Jutiapa. Mexico; Costa Rica; Panama; West Indies.

Perennial; culms erect, relatively slender, up to 2.5 meters high; sheaths papillose-hispid, papillose only, or glabrate; blades linear, attenuate, flat, commonly 5–10 mm. wide, scabrous; panicles 20–40 cm. long, densely flowered, sometimes interrupted below, the branches narrowly ascending or appressed; spikelets 4.5–5 mm. long, the awn of the fertile floret commonly 5 mm. long, the lower twisted portion about 2 mm. long, distinctly longer than the sterile lemma.

Arundinella deppeana Nees in Steud. Syn. Pl. Glum. 1: 115. 1854. *A. phragmitoides* Griseb. Cat. Pl. Cuba 234. 1866. *Cola de venado* (Quezaltenango).



FIG. 9. *Arundinella confinis*. Panicle, $\times \frac{1}{2}$; spikelet and floret, $\times 10$.

Pine forests, brushy slopes, moist thickets, clay hills, and gravelly banks, up to 1,300 meters; Alta Verapaz; Izabal; Jalapa; Santa Rosa; Guatemala; Retalhuleu; Quezaltenango; San Marcos. British Honduras; West Indies; Mexico to Brazil.

Coarse perennial; culms erect, 1–2.5 meters high, glabrous; sheaths all much longer than the internodes, rather firm but loose, densely papillose-hispid with appressed hairs, especially toward the summit; ligule membranaceous, about 0.5 mm. long; blades elongate, attenuate, flat, scabrous and sparsely to densely papillose-hispid; panicles 25–70 cm. long, dense, somewhat interrupted below, the slender straight or commonly flexuous branches in dense closely overlapping fascicles, some naked at the base, the lower ones 10–15 cm. or rarely as much as 25 cm. long; spikelets 4–5 mm. long, appressed; glumes acuminate, the first 3-nerved, the second much longer than the first, 5-nerved; sterile lemma acute; awn of fertile floret about 1 cm. long, geniculate, not twisted, slender and flexuous above the bend.

AVENA L.

Spikelets 2- or 3-flowered, the rachilla bearded, disarticulating above the glumes and between the florets; glumes about equal, 7- to 9-nerved, longer than the lower floret; lemmas indurate, 5–9-nerved, bidentate, bearing a dorsal, geniculate, twisted awn.

Annuals with rather broad, flat blades and open panicles of large spikelets.

Species about 10, all in the Old World; introduced in America.

Avena fatua L. Sp. Pl. 80. 1753.

In wheat field, Volcán Zunil, Quezaltenango. Introduced from Europe.

Culms erect, 30 cm. to more than 1 meter high, slender to rather coarse, smooth and shining; sheaths smooth, usually shorter than the internodes; blades flat, linear, 4–15 mm. wide, scabrous; panicles 15–30 cm. long, loose, the branches ascending or spreading, more or less flexuous; spikelets 3-flowered on slender curved peduncles; glumes about 2.5 cm. long; lemmas 2 cm. long, the lower part covered with long, stiff, brownish or whitish hairs, the teeth acuminate; awn 3–4 cm. long, geniculate, twisted below.

AXONOPUS Beauv.

Spikelets solitary, sessile in two rows on one side of the 3-angled rachis, the back of the fruit turned from the rachis; first glume wanting; second glume and sterile lemma equal, often pointed beyond the fruit; fertile lemma and palea indurate, the lemma oblong-elliptic, the margins slightly inrolled.

Caespitose or stoloniferous perennials with flat or folded, rounded or pointed blades, and few to several slender racemes, digitate or racemose on the common axis.

Species about 80; tropical and subtropical America.

Rachis conspicuously hispid with stiffly spreading golden yellow hairs. . . *A. aureus*.
Rachis glabrous or scabrous.

Plants stoloniferous.

Spikelets 2–2.5 mm. long, the second glume and sterile lemma extending well beyond the fruit; blades commonly 8–10 mm. wide. *A. compressus*.

Spikelets 2 mm. long, the second glume and sterile lemma only slightly pointed beyond the fruit; blades commonly 2–4 mm. wide, rarely as much as 5–6 mm. wide. *A. affinis*.

Plants not stoloniferous.

Second glume and sterile lemma much longer than the fruit; blades lax, 6–10 mm. wide. Sheaths strongly compressed, glabrous. *A. centralis*.

Second glume and sterile lemma scarcely exceeding the fruit.

Spikelets 3.6–4.2 mm. long. *A. elongatus*.

Spikelets not more than 3 mm. long.

Plants with usually well-developed scaly rhizomes.

Spikelets 2–2.3 mm. long; fruit dark brown. *A. ciliatifolius*.

Spikelets 2.5–3 mm. long; fruit pale. *A. rhizomatosus*.

Plants caespitose, without rhizomes.

Spikelets not more than 2 mm. long. *A. purpusii*.

Spikelets 3 mm. long.

Spikelets glabrous or nearly so; nodes appressed pubescent.

. *A. poiophyllus*.

Spikelets densely hairy on the margins; nodes conspicuously bearded.

Sheaths and blades rather densely papillose-pilose. . . *A. blakei*.

Axonopus affinis Chase, Jour. Washington Acad. Sci. 28: 180. f. 2. 1938.

Moist banks, thickets, swamps, and open ground, sea level to 1,500 meters; Alta Verapaz; Chiquimula. Southeastern United States, Mexico and the West Indies to Argentina.

Similar in habit and aspect to *A. compressus* and formerly included with it; blades narrower, often elongate; spikelets 2 mm. long; second glume and sterile lemma about as long as the fruit, not pointed beyond it.

Axonopus aureus Beauv. Ess. Agrost. 12, 154. 1812. *Paspalum aureum* H.B.K. Nov. Gen. & Sp. 1: 93. 1815. *Axonopus pulcher* Kuhlmann. Comm. Linhas Telegr. Estrat. Matto Grosso 67: 88. 1922.

Savannas and pine ridges, 1,200–1,400 meters; Chiquimula. British Honduras (El Cayo, Belize, and Toledo Districts) to Brazil and Bolivia; Puerto Rico; Trinidad.

Perennial; culms 35–90 cm. high, rarely more than 1 meter, erect, branching; sheaths compressed, keeled, glabrous, the margins sometimes ciliate; ligule ciliate,

about 0.5 mm. long; blades 4–15 cm. long, 3–9 mm. wide, spreading, firm, flat or drying involute toward the tip, glabrous, the margins scabrous, sometimes sparsely ciliate toward the rounded base; racemes 2–15, slender, ascending, crowded on a short hairy axis; rachis 0.4–0.7 mm. wide, conspicuously papillose-ciliate with stiff golden yellow or brown hairs, bearing below each spikelet a tuft of similar hairs; spikelets 1.3 mm. long, glabrous or sparsely appressed-hispid.

Axonopus blakei Hitchc. Proc. Biol. Soc. Washington 40: 85. 1927.

Open grassy plains; Izabal (type from Cristina, *Blake* 7611). Honduras.

Perennial; culms densely tufted, erect, about 60 cm. tall, the nodes densely villous with ascending hairs; sheaths pilose, especially toward the summit; blades flat, folded at the base, as much as 25 cm. long, 2–4 mm. wide, papillose-pilose; racemes 3–4, 7–12 cm. long, ascending, pubescent or pilose at the base; spikelets 3 mm. long, the second glume and sterile lemma densely pilose on the margins, sparsely pilose or glabrous on the back, the hairs at the summit as much as 1 mm. long.

Axonopus centralis Chase, Jour. Washington Acad. Sci. 17: 143. 1927.

Damp brushy slope, 870 meters; Chiquimula. Honduras; El Salvador; Nicaragua; Panama.

Perennial; culms in large clumps, 40–90 cm. high, erect to stiffly spreading, simple, compressed, glabrous; sheaths keeled, usually pubescent on the margins at least toward the summit and on the collar, otherwise glabrous; ligule short, firm, fimbriate; blades 15–50 cm. long, 6–10 mm. wide, flat, or folded at the base, sparsely pubescent on the upper surface, glabrous on the lower, the margins ciliate toward the base; inflorescences terminal and axillary, finally long-exserted; racemes 2–6, 8–15 cm. long, ascending or spreading, the upper 2 or 3 approximate, the lower remote, the rachis about 0.5 mm. wide, flexuous, minutely scabrous on the margins; spikelets 3 mm. long, oblong, rather distant, the glume and sterile lemma equal, extending beyond the fruit, silky pubescent on the internerves; fruit 2 mm. long, oblong-elliptic, pale.

Axonopus ciliatifolius Swallen, Jour. Washington Acad. Sci. 23: 458. 1933.

Known only from the type, collected at Mountain Pine Ridge, El Cayo District, British Honduras, *Bartlett* 11746.

Culms densely tufted, erect from short scaly rhizomes, 50–70 cm. tall, with terminal and axillary inflorescences; leaves mostly crowded toward the base, the sheaths keeled, sparsely pubescent, the blades flat, 7–16 cm. long (or those on the innovations sometimes longer), 1–2 mm. wide, pilose on both surfaces, the margins papillose-ciliate, especially toward the base; ligule 0.1 mm. long; racemes 2–5, racemose, ascending or appressed, 3–11.5 cm. long; spikelets 2–2.3 mm. long,

glabrous or sparsely pubescent, the second glume and sterile lemma subequal, obtuse, scarcely covering the fruit; fruit dark brown, smooth and shining.

Axonopus compressus (Swartz) Beauv. Ess. Agrost. 12. 1812. *Milium compressum* Swartz, Prodr. Veg. Ind. Occ. 24. 1788. *Paspalum compressum* Raspail, Ann. Sci. Nat. 5: 301. 1825. *P. laticulmum* Spreng. Syst. Veg. 1: 245. 1825. *Anastrophus compressus* Schlecht. ex Doell in Mart. Fl. Bras. 2 (2): 102. 1877. *Paspalum raunkiaerii* Mez, Repert. Sp. Nov. Fedde 15: 60. 1917. Figure 10.

Open ground, brushy hillsides, and along roads, usually in moist places, sea level to more than 1,300 meters; Petén; Alta Verapaz; Izabal; Huehuetenango; Quezaltenango; Escuintla; Suchitepéquez. British Honduras; southeastern United States and the West Indies to Argentina; warmer parts of the Old World.

Stoloniferous perennial; culms in small tufts, 15–60 cm. high, compressed, erect or ascending, the nodes appressed-pubescent or sometimes bearded; sheaths keeled, glabrous, pubescent on the collar, the margins hyaline, glabrous or ciliate, the lower ones relatively short, much longer than the internodes, the upper one elongate; blades 5–15 cm. long, or those of the innovations elongate, 6–10 mm. wide, rarely as little as 4 mm. or as much as 12 mm. wide, obtuse, rounded at the base, glabrous, the margins usually ciliate at least toward the base; inflorescences terminal and axillary from the upper sheaths, composed of 2–5 ascending or spreading racemes, 3–9 cm. long, the upper two conjugate, the others a short distance below; spikelets 2–2.5 mm. long (rarely 3 mm.); second glume and sterile lemma pointed beyond the fruit, glabrous or sparsely pubescent on the internerves; fruit 1.5–2 mm. long, oblong, minutely roughened.

Axonopus elongatus Swallen, Contr. U. S. Nat. Herb. 29: 414. 1950.

Pine forests, 1,700–2,000 meters; Zacapa (Sierra de las Minas, below Finca Alejandria, *Steyermark* 29781, type).

Perennial, probably with rhizomes; culms erect, about 1 meter tall, glabrous; sheaths longer than the internodes, compressed, keeled, appressed pilose on the margins toward the summit or nearly glabrous, the uppermost elongate, about 40 cm. long; ligule a ciliate membrane 0.5–1 mm. long; blades 23–24 cm. long, 3.5–4.5 mm. wide, flat, firm, scabrous at least on the margins, more or less papillose-ciliate at the base; inflorescences terminal and axillary, long-exserted; racemes 2–6, 8–13 cm. long, stiffly ascending, the rachis 0.6 mm. wide, scabrous on the margins; spikelets 3.6–4.2 mm. long, 1.2 mm. wide, the pedicels 0.5 mm. long; second glume and sterile lemma equal, acute, exceeding the fruit, sparsely pilose between the nerves or nearly glabrous, the midnerve of the glume rather prominent; fruit 3.2 mm. long, subobtuse, pale, glabrous.

Axonopus poiophyllus Chase, Proc. Biol. Soc. Washington 24: 133. 1911. *Anastrophus poiophyllus* Nash, N. Amer. Fl. 17: 163. 1912.



FIG. 10. *Axonopus compressus*. Plant, $\times \frac{1}{2}$; two views of spikelet, and floret, $\times 10$.

Grassy hills and ravines, at low altitudes; Alta Verapaz (Secanquim, *Cook & Doyle* 58, type). Honduras.

Perennial; culms densely tufted, erect, as much as 80 cm. tall, the nodes appressed-pilose; basal sheaths crowded, pilose with appressed or spreading hairs, those of the culm elongate, glabrous; blades elongate, flat, conduplicate at the base, 2-7 mm. wide, glabrous, or more or less pilose at the base; inflorescence long-exserted, of 3-4 narrowly ascending racemes; spikelets 3 mm. long, acute, the second glume and sterile lemma slightly exceeding the fruit, glabrous or sparsely pilose on the margins.

Axonopus purpusii (Mez) Chase, Jour. Washington Acad. Sci. 17: 144. 1927. *Paspalum purpusii* Mez, Bot. Jahrb. Engler 56: Beibl. 125: 10. 1921.

Savannas and pinelands; Petén; Izabal. British Honduras; southern Mexico to Argentina.

Perennial; culms very slender, densely tufted, erect, 15-40 cm. high; leaves crowded toward the base, only one about the midculm, this with elongated sheath and reduced blade; sheaths compressed, keeled, glabrous to sparsely pilose with a dense tuft of hairs at the mouth; blades flat, conduplicate at the base, mostly 5-10 cm. long, rarely as much as 20 cm., 1-4 mm. wide, densely hairy on the upper surface toward the base, otherwise sparsely pilose or nearly glabrous; inflorescences terminal and sometimes axillary, composed of 2-4 slender ascending racemes 3-8 cm. long; spikelets 2 mm. long; second glume and sterile lemma somewhat pointed beyond the fruit, the margins stiffly appressed-pilose, the hairs longer at the summit, forming a rather prominent tuft at the tip of the spikelet.

Axonopus rhizomatosus Swallen, Jour. Washington Acad. Sci. 23: 458. 1933.

Open pine forests and pine ridges, up to 1,400 meters; Alta Verapaz; Izabal. British Honduras (Toledo District); Honduras.

Culms caespitose, erect from short scaly rhizomes, 45-85 cm. tall, the nodes densely pubescent; sheaths keeled, rather densely pilose, especially on the collar, or nearly glabrous; blades flat, as much as 25 cm. long, 1-4 mm. wide, the uppermost reduced, not over 2 cm. long, sometimes nearly wanting, smooth or scaberrulous, more or less pilose toward the base, the margins papillose-ciliate for a short distance at the base; ligule 0.1-0.2 mm. long; racemes 2-4, appressed, 5-13 cm. long, subdigitate with one a short distance below the others; spikelets 2.5-3 mm. long; second glume and sterile lemma equal, acute, slightly exceeding the pale or lead-colored fruit, the margins densely pilose, especially toward the summit.

BAMBUSA Schreb.

Caespitose, unarmed or spiny-branched bamboos with stout, determinate rhizomes; culms erect or ascending, usually more or less nodding or arched at the tip, but not climbing; culm sheaths promptly deciduous in most species; culm

branches rarely solitary in part, usually fasciculate, the central one at each node strongly dominant and flanked by several pairs of progressively shorter, more slender ones; leaf blades without typically tessellate venation. Inflorescences in subsessile pseudospikelets, solitary or more commonly in more or less dense aggregates, at the nodes of very short axes lateral to leafy or more commonly leafless branches, the aggregates usually growing more dense in time, as the buds basal to the pseudospikelets develop, successively, into additional pseudospikelets; spikelets terminal to pseudospikelets and preceded on the same axis by one to three glumes subtending buds; rachilla usually disarticulating more or less readily at maturity; florets several to many, each subtended by a lemma and a two-keeled palea; lodicules usually 3; stamens 6, the filaments filiform and free, or rarely flattened, with some of them more or less firmly adhering at the margins at first (as in *B. vulgaris*); ovary typically solitary, with a single style and 1-3 plumose stigmas. Fruit a caryopsis.

About 85 recognizable species known to science are properly assigned to this genus. All are native to the Old World tropics, their principal center of distribution being in southeastern Asia. A number of those that afford useful raw materials or are desirable ornamental plants have become rather widespread in cultivation.

Lower branches spiny.....*B. arundinacea*.

Lower branches unarmed.

Auricles of culm sheath not at all or scarcely developed.

Culm internodes solid.....*B. multiplex*, H.F. Chinese Goddess.

Culm internodes hollow.

Culm internodes glabrous (large bamboos, with culms erect to tip).

B. oldhami.

Culm internodes antrorse-hispid (small bamboos, the culms broadly arched above).

Culm internodes green.....*B. multiplex*.

Culm internodes green-striped yellow..*B. multiplex*, H.F. Alphonse Karr.

Auricles of culm sheaths more or less well developed.

Lower culm sheaths narrowly subtriangular, the sheath blade with a long, slender tip.

Culm sheath proper truncate at apex.....*B. textilis*.

Culm sheath proper broadly convex at apex.

Culm internodes always cylindrical; small branches at the nodes relatively few; culm sheaths drying nearly flat.....*B. tulldoides*.

Culm internodes often more or less shortened and flask-shaped; twigs at culm nodes very numerous, the principal branch very long; culm sheaths drying with margins inrolled.....*B. ventricosa*.

Lower culm sheaths relatively short and broad, not narrowly triangular; the sheath blade relatively short, abruptly acuminate at apex.

Sheath blade much narrower than the apex of the sheath proper, auricles equal, falcate spreading.

Culms and branches green.....*B. vulgaris*.

- Culms and branches green-striped yellow *B. vulgaris*, H.F. *vittata*.
 Sheath blade as wide as the apex of the sheath proper, auricles dissimilar,
 one orbicular, the other oblong decurrent.
 Culm internodes glabrous *B. tulda*.
 Culm internodes more or less conspicuously scabrous below the nodes.
B. longispiculata.

Bambusa arundinacea Willd. sensu Gamble, J. S., Ann. Roy. Bot. Gard. Calcutta 7: 51. *pl.* 48. 1896.

Although the name here used cannot be given authentic legal standing as applied to this bamboo, it is the one most consistently used in the literature for over a hundred years; cf. F. A. McClure, The genus *Bambusa* and its first-known species. Blumea, Suppl. III: 90-112. 1946.

The Giant Thorny Bamboo native and widely cultivated in India, where it is important as a source of structural materials; commonly planted to form living barriers around villages. Introduced here and there, but apparently nowhere abundant, in the tropics of both hemispheres. Propagating material from the United Fruit Company's Botanic Garden at Lancetilla, Honduras, introduced into Guatemala in 1946 by the Instituto Agropecuario Nacional, has been established at Finca Chocóla, Suchitepéquez, for observation and trial.

Clumps densely compact; the culms here reaching a height of 20 or 25 meters and a diameter of 10 or 15 cm., erect to the tip, or more commonly broadly arched above; the internodes relatively short, glabrous, the basal ones very thick-walled (to about 2 cm.), the middle ones only moderately so (to about 1 cm.), the lower nodes prominent, fringed at first with stiff brown hairs; culm sheaths deciduous (somewhat tardily so at the basal nodes), leathery, with a zone of brown hairs along the base, otherwise dorsally glabrous; auricles and oral setae not at all developed; sheath blades broadly triangular, appressed (reflexed at the upper nodes), persistent, densely strigose with coarse black hairs on the inner surface, glabrous on the outer surface; branches thorny, solitary and very long in the lower part of the culm, then in 2's and 3's, and shorter, above; leaf sheaths glabrous or sparsely hispid; auricles and oral setae irregularly developed, the latter fugacious; leaf blades linear-lanceolate, acuminate, up to 20 × 2.5 cm., glabrous or with a few long hairs near the base on the upper surface, glabrous or puberulent on the lower surface.

Bambusa longispiculata Gamble ex Brandis, Indian Trees 668. 1906.

Native of India, introduced into the Western Hemisphere by the United States Department of Agriculture. The Instituto Agropecuario Nacional secured from the Federal Experiment Station at

Mayaguez, Puerto Rico, propagating material for the bamboo collection at Finca Chocóla, Suchitepéquez, where it is now well established.

In appearance and morphological characteristics this bamboo is closely similar to *Bambusa tulda*, from which it may be distinguished in the field by the pubescent, aciculate surface of the lower internodes of the culm. Besides this, the clump growth is somewhat more open, and the ultimate mature culm stature is smaller (culms reach a height of 12 or 15 meters and a diameter of about 5 cm. under favorable conditions), and the culm walls are relatively thinner.

This species was set up by Gamble principally on the basis of the unusual length of the spikelets, which are said to reach 4 inches (10 cm.).

Also established at Finca Chocóla is a form of this bamboo which differs from the species in having the culms and culm sheaths variegated with vertical stripes of a greenish cream tint.

Bambusa multiplex (Lour.) Raeusch. ex Schult. Syst. Veg. 7: 1350. 1830. *B. nana* Roxb. Fl. Ind. 2: 199. 1832.

Native of China; pantropic in cultivation, principally as an ornamental. Introduced by the Instituto Agropecuario Nacional from the Experiment Gardens, Canal Zone, and established at Finca Chocóla, Suchitepéquez, for trial in the local economy.

Usually a small bamboo, in densely crowded clumps, the culms ascending (rarely erect), straight or broadly arched, commonly 3–4 meters tall and 1.5–2 cm. in diameter, rarely 9 meters tall and 2.5 cm. in diameter, the internodes relatively long (up to 60 cm.), hollow, thin-walled, the surface antrorse-hispid and aciculate; nodes very slightly or not at all flared at the sheath scar, not at all inflated. Culm sheaths somewhat tardily deciduous, glabrous, narrowly triangular; auricles and oral setae not at all or only slightly developed; the sheath blade appressed, abscissile, usually antrorse-hispid on both surfaces, then glabrescent. Branches very numerous and relatively slender. Leaf sheaths glabrous; auricles and oral setae absent or weakly developed; leaf blades linear-lanceolate, of variable size, sometimes to 15 × 2 cm., glabrous on the upper surface, conspicuously glaucous and pubescent on the lower surface.

Horticultural Form, Alphonse Karr.

A native of China, this bamboo occurs rarely as a garden plant in Guatemala City. The history of its introduction is not known.

This form differs from the species, *Bambusa multiplex*, principally in the coloration of the culms and branches and their sheaths, which are typically green-striped yellow. In the young shoots, this coloration is often tinged with a flush of pink. This form has been observed to revert to the species, losing its distinctive coloration completely.

Horticultural Form, **Chinese Goddess.**

Native of China, pantropic in cultivation, as an ornamental. Introduced by the Instituto Agropecuario Nacional from the United States Department of Agriculture collection at Savannah, Georgia, and established at Finca Chicolá, Suchitepéquez, for trial.

Distinguished from *Bambusa multiplex* by its small stature (culms here scarcely exceeding 1.5 meters), the solid (not fistulose), glabrous internodes, and the more numerous, very small leaf blades (commonly $15-30 \times 3-5$ mm., rarely 50×10 mm.).

Bambusa oldhami Munro, Trans. Linn. Soc. 26: 109. 1868. *Sinocalamus oldhami* (Munro) McClure, Lingnan Univ. Sci. Bull. 9: 67. 1940.

Native of Formosa, early introduced into the United States through the agency of private West Coast horticulturists, and now commonly cultivated in California and Florida as an ornamental, under the misapplied name *Dendrocalamus latiflorus*. Frequent in Lima, Peru, as an ornamental; otherwise rarely seen in the Western Hemisphere outside of the United States and Puerto Rico. Propagating material from the Federal Experiment Station at Mayaguez, Puerto Rico, was introduced by the Instituto Agropecuario Nacional, and established at Finca Chicolá, Suchitepéquez, for trial in the local economy.

Clump compact, slow-spreading, the culms very erect almost or quite to the tip, somewhat sinuous, the internodes of moderate length, glabrous, the wood about one cm. thick, the nodes only slightly inflated. Culm sheaths promptly deciduous, oblong, rounded at the shoulders, irregularly appressed brown-sericeous, gradually glabrescent; the auricles and oral setae rather small when present; sheath blade broadly subtriangular with concave sides, apically acuminate, appressed, abscissile, lightly antrorse-hispid on the inner surface, glabrous on the outer surface. Branches few, irregularly developed, coarse, relatively short, the central one at each node often tardily developed and often rooting spontaneously at the bulbous base in older culms. Leaf sheaths glabrous or sparsely hispidulous; auricles and oral setae usually lacking; leaf blades oblong-lanceolate, abruptly acuminate, up to 22×3 cm., glabrous on the upper surface, puberulent at first, then glabrescent, on the lower surface.

Bambusa textilis McClure, Lingnan Univ. Sci. Bull. 9: 14. 1940.

A cultivated bamboo, presumably native of southern China, whence it was introduced into the Western Hemisphere by the United States Department of Agriculture. From the Federal Experiment Station at Mayaguez, Puerto Rico, the Instituto Agropecuario Nacional secured propagating material for the collection

at Finca Chicolá, Suchitepéquez, where it is under trial. In southern China, this bamboo is one of the most useful species, being one of the principal sources of withes for weaving basketry and matting, and for fabricating cables for towing boats. It is also much used in making furniture. Small culms from plants grown under unfavorable conditions are much used, and are very durable, as garden stakes, and for making picket fences. The plant is a very desirable garden ornamental.

Clumps compact, with erect culms reaching, under favorable conditions, a height of 12 meters and a diameter of 5 cm., the internodes up to 40 cm. or more in length, hollow, relatively thin-walled (about 5 mm.), antrorse-hispid, aciculate, the nodes not inflated but flaring appreciably at the sheath scar. Culm sheaths promptly deciduous (drying nearly flat), glabrous or nearly so in mature plants (pubescent at first in young ones), narrowly subtriangular; auricles and oral setae slightly to moderately well developed; sheath blade narrowly triangular or ovate-lanceolate, basally nearly as wide as the apex of the sheath proper, appressed, partially abscissile, antrorse-hispid or subglabrous on the inner surface, sometimes sparsely strewn with acicular appressed hairs near the base, otherwise glabrous on the outer surface. Branches beginning to develop only some months after the culm reaches its full height, numerous, slender, the central one less markedly dominant than in most species of the genus; the branch complement, and the bud from which it arises, lacking at all nodes in the lower one-half or so of culms in mature clumps. Leaf sheaths slender, glabrous or glabrescent, auricles and oral setae usually well developed, fugacious; leaf blades narrowly ovate-lanceolate, acuminate, $15-20 \times 1.2-2$ cm., glabrous on the upper surface, lightly glaucous and pubescent throughout on the lower surface.

***Bambusa tulda* Roxb. Fl. Ind. 2: 193. 1832.**

Native of India, where it is important in the local economy, principally as a source of culms for structural purposes, this bamboo was introduced into the Western Hemisphere by the United States Department of Agriculture. Propagating material was obtained by the Instituto Agropecuario Nacional from the Federal Experiment Station at Mayaguez, Puerto Rico, and established in the bamboo collection at Finca Chicolá, Suchitepéquez, for trial in the local economy.

Clump rather compact, the culms reaching, under favorable conditions, a height of 20 meters and a diameter of 10 cm., ascending or suberect, broadly arched at the tip, the internodes elongate, thick-walled, sometimes nearly solid, entirely glabrous, the lower nodes appreciably inflated. Culm sheaths deciduous, broadly triangular, more or less densely clothed with black, deciduous, acicular hairs, the auricles well developed, strongly unequal, one suborbicular, the other oblong, decurrent, wavy, both fringed with oral setae; sheath blade partially abscissile, subovate, abruptly acuminate above, concave below to conform to the strongly convex apex of the sheath proper. Branches several, strongly unequal. Leaf sheaths usually glabrous, the auricles and oral setae lacking or more often



FIG. 11. *Bambusa vulgaris* Schrad. ex Wendl. 1, leaf-branch, $\times \frac{1}{2}$; 2, part of flowering branch, $\times \frac{1}{2}$; 3, portion of young culm, $\times \frac{1}{2}$; 4, culm-sheath (var. *striata*), about $\times \frac{1}{8}$; 5, young branch (var. *striata*), $\times \frac{1}{2}$; 6, leaf-sheath, $\times 1$; 7, spikelet, ca. $\times 1$; 8, empty glume, slightly enlarged; 9, flowering glume, ca. $\times 1$; 10, palea, slightly enlarged; 11, lodicule, slightly enlarged; 12, anther, slightly enlarged; 13, ovary with style and stigmas, slightly enlarged. From J. S. Gamble, *Bambuseae of British India*, Calcutta Botanic Gardens, *Annals* 7: pl. 40. 1907.

well developed, fugacious; leaf blades oblong or linear-lanceolate, acuminate, $15-25 \times 2-3$ cm., glabrous on the upper surface, faintly glaucous and pubescent on the lower surface.

Bambusa tuldoidea Munro, Trans. Linn. Soc. 26: 93. 1868.

This cultivated bamboo from southern China, where it is locally important for structural purposes, basketry and punting poles, was introduced into the Western Hemisphere by the United States Department of Agriculture. Propagating material from the Federal Experiment Station at Mayaguez, Puerto Rico, was secured by the Instituto Agropecuario Nacional and established at Finca Chocóla, Suchitepéquez, for trial in the local economy.

Clumps compact, culms stiffly erect (spreading in very young plants), reaching 15 meters \times 5 cm. under favorable conditions; internodes of moderate length, glabrous, glaucous at first, the nodes only slightly inflated. Culm sheaths deciduous, narrowly triangular, glabrous, commonly bearing two fine white vertical stripes on one side of the sheath proper, the auricles well developed, unequal, one suborbicular, the other oblong-ovate, fringed with oral setae; sheath blade appressed, partially abscissile, narrowly ovate-lanceolate, antrorsely scabrous on the inner surface, glabrous on the outer surface. Branches developed at all but the lower one or two nodes of the culm, numerous, strongly unequal. Leaf sheaths glabrous, the auricles and oral setae irregularly developed, fugacious; leaf blades narrowly lanceolate, acuminate, up to 25×2.5 cm., glabrous on the upper surface, lightly glaucous and pubescent throughout on the lower surface.

Bambusa ventricosa McClure, Lingnan Sci. Jour. 17: 57. *pl.* 5. 1938.

Plant of unknown origin, cultivated in southern China as a potted ornamental for the curious form which its culms assume under unfavorable conditions of growth. It was introduced into the Western Hemisphere by the United States Department of Agriculture. From the Federal Experiment Station at Mayaguez, Puerto Rico, the Instituto Agropecuario Nacional secured propagating material for its collection at Finca Chocóla, Suchitepéquez, principally for trial as an ornamental, a windbreak, and a supplementary source of forage for semi-arid areas.

Clumps compact, culms erect or ascending, reaching, under favorable conditions, a height of 12 or 15 meters and a diameter of 4 cm., the internodes moderately thick-walled, glabrous, very dark green. (Under unfavorable conditions the internodes of the culms and the principal branches are shortened and basally inflated to a somewhat asymmetrical flask-like shape, with a corresponding reduction in culm stature.) Nodes only very slightly flared at the sheath scar, scarcely inflated. Culm sheaths deciduous (tending to roll inward longitudinally along the edges on drying), narrowly triangular, glabrous; auricles and oral setae only moderately developed; the sheath blade often slightly asymmetrical, narrowly triangular or

ovate-lanceolate, basally nearly as wide as the sheath proper, appressed, partially abscissile, scabrous on the inner surface, glabrous on the outer surface. Branches developed at all nodes, the smaller ones very numerous, the central one at each node usually very long. Leaf sheaths glabrous, the auricles and oral setae not or only moderately developed, fugacious; leaf blades narrowly oblong-lanceolate, up to 21×3.3 cm., glabrous on the upper surface, pubescent on the lower surface.

Bambusa vulgaris Schrad. ex Wendl. Coll. Pl. 2: 26. *pl.* 47. 1810.
Figure 11.

A bamboo of doubtful origin, probably a native of Madagascar, possibly also of India, now pantropic in cultivation. The culms are much used for structural purposes and for banana props. The wood is highly susceptible to invasion by the powder post beetle (*Dinoderus* spp.) unless specially treated. The young shoots are eaten in Java; in Nicaragua, they are canned for the market by Chinese residents.

Long since introduced in Guatemala, probably by the early Spanish colonists, this species as represented by the green-striped yellow form (*H. F. vittata*) is now widespread at lower and medium elevations. Doubtless to be found in every Department, it occasionally is seen at an elevation exceeding 1,400 meters.

Clumps naturally open (becoming crowded when only outer culms are cut), the culms erect or usually more or less spreading, broadly arched above, in Guatemala rarely exceeding a height of about 15 meters and a diameter of 7-8 cm. (elsewhere to 20 meters \times 10 cm.), the internodes up to 45 cm. long, glabrous, the nodes appreciably inflated and flaring at the hirsute, glabrescent sheath scar; culm sheaths promptly deciduous, the lower ones broader than long, densely clothed with brown, appressed, deciduous hairs, the auricles well developed, equal, falcate-spreading, sparsely fringed with oral setae, the sheath blade appressed, usually persistent, ovate-triangular, abruptly acuminate, much narrower than the apex of the sheath proper, strigose with coarse, dark, partly deciduous bristles on the inner surface, glabrous on the outer surface; branches developed at all but a few of the lower culm nodes in young clumps, suppressed in the lower part of the culm in mature and crowded clumps; leaf sheaths glabrous or sparsely hispidulous; auricles and oral setae irregularly developed, fugacious; leaf blades linear-lanceolate, acuminate, to 25×4 cm., glabrous or nearly so on both surfaces.

Horticultural Form, *vittata* A. & C. Riv.

This form, with green-striped yellow culms and branches is almost universally found here, as throughout the Central American mainland, with the green form (typical of the species) appearing here and there as a pure green clump, but principally as an occasional reverted culm in an otherwise yellow clump. In the Caribbean islands, on the other hand, the green-culmed species predominates, while the green-striped yellow form occurs as the exception. Reciprocal reversions between this and the green form occur frequently.

BOUTELOUA Lag.

Spikelets few- to several-flowered, with one fertile floret and one or two rudimentary florets above it, the second floret often staminate and sometimes perfect; glumes 1-nerved, the first narrow, the second much broader, twice as long as the first, or both broad, similar and subequal; fertile lemma 3-nerved, glabrous or bearded at the base, glabrous or pilose on the margins and sometimes pilose across the back, the tip variously lobed or dentate, the nerves usually excurrent in short awns; rudiment reduced to 3 awns, or glumaceous, lobed or dentate, with 3 usually conspicuous awns.

Perennial, usually tufted grasses, with slender culms and few to many short 1-sided spikes, racemose on a short or often elongated axis.

Species 40, America, mostly in North America.

Spikes persistent; spikelets pectinate *B. glandulosa*.

Spikes deciduous; spikelets not pectinate.

Plants annual *B. disticha*.

Plants perennial.

Spikes fewer than 15.

Second glume hairy *B. chondrosioides*.

Second glume glabrous or scabrous, sometimes hispid on the keel.

Sheaths and blades glabrous or sparsely pilose.

Lemma of the upper floret deeply cleft *B. repens*.

Lemma of the upper floret minutely dentate *B. filiformis*.

Sheaths and blades densely pubescent *B. pubescens*.

Spikes usually more than 20.

Spikes with only one spikelet *B. triaena*.

Spikes with two or more spikelets *B. curtipendula*.

Bouteloua chondrosioides (H.B.K.) Benth. ex S. Wats. Proc. Amer. Acad. Sci. 18: 179. 1883. *Dinebra chondrosioides* H.B.K. Nov. Gen. & Sp. 1: 173. pl. 53. 1816. *Chondrosium humboldtianum* Kunth, Rev. Gram. 1: 93. 1829. *Bouteloua havardii* Vasey ex S. Wats. Proc. Amer. Acad. Sci. 18: 179. 1883.

Rocky slopes, near Santa Rosalia, 250-300 meters, Department Zacapa, *Steiermark* 29043. Texas and southern Arizona to Costa Rica.

Perennial; culms tufted, erect, 15-55 cm. tall, glabrous; leaves clustered toward the base, the sheaths glabrous, hispid at the throat, the blades flat, firm, 4-12 cm. (rarely more than 15 cm.) long, 2-3 mm. wide, glabrous or sparsely hispid, the margins often papillose-ciliate toward the base; ligule ciliate, about 0.5 mm. long; spikes 3-8, falling entire, ascending or spreading, rhomboid, tinged with purple, 1-1.5 cm. (rarely to 2 cm.) long, the rachis densely long-ciliate on the margin; spikelets crowded, appressed or more or less pectinately arranged; first glume 3-5 mm. long, acuminate, ciliate on the keel; second glume 7-8 mm.

long, acuminate, hairy; lemma about 7 mm. long, hairy, especially on the midnerve and margins, the tip three-toothed, awnless; awns of the rudimentary floret 5-10 mm. long, scabrous.

Bouteloua curtipendula (Michx.) Torr. in Emory, Mil. Notes Recon. 154. 1848. *Chloris curtipendula* Michx. Fl. Bor. Amer. 1: 59. 1803. *Bouteloua racemosa* Lag. Var. Cienc. 2, no. 4: 141. 1805. *Atheropogon curtipendulus* Fourn. Mex. Pl. 2: 138. 1886. *A. acuminatus* Fourn. Mex. Pl. Gram. 2: 139. 1886. *Bouteloua acuminata* Griffiths, Contr. U. S. Nat. Herb. 14: 406. 1912. Figure 12.

Known in Guatemala only from Naranjo, Department Santa Rosa, Heyde & Lux 3930. Canada (Ontario) and United States to El Salvador; Ecuador to Argentina.

Perennial; culms erect from short rhizomes, 30 cm. to more than a meter tall; sheaths mostly shorter than the internodes, rounded, glabrous or sparsely papillose-pilose, more or less pilose at the throat; ligule 0.5 mm. long, ciliate; blades as much as 25 cm. long, 2-5 mm. wide, flat, attenuate, scabrous, especially on the margins, the upper surface sometimes pilose; spikes mostly 20-40, 0.5-2 cm. long, spreading or reflexed, falling entire; spikelets crowded, appressed or somewhat spreading; first glume about 4 mm. long, narrow, acuminate, scabrous on the keel; second glume 6-8 mm. long, much broader than the first, acute, scabrous; lemma 5-6 mm. long, glabrous or sparsely pilose, the tip 3-toothed; rudiment from nearly obsolete to as much as 5 mm. long and rather broad, awned from between the teeth of the bifid apex, the awn mostly 3-6 mm. long, the lateral nerves excurrent in slender awns, from minute to 4 mm. long, often enclosing a second very small rudiment; spikelets in the upper spikes smaller, the rudiment inconspicuous or nearly obsolete.

Bouteloua disticha (H.B.K.) Benth. Jour. Linn. Soc. 19: 105. 1881. *Polyodon distichum* H.B.K. Nov. Gen. & Sp. 1: 175. 1816. *Atheropogon distichus* Spreng. Syst. Veg. 1: 294. 1825. *Eutriana pilosa* Hook. f. Trans. Linn. Soc. 20: 173. 1847. *Bouteloua pilosa* Benth. ex S. Wats. Proc. Amer. Acad. Sci. 18: 179. 1883.

Thickets, llanos, and dry open ground, up to 900 meters; Chiquimula; Santa Rosa; Suchitepéquez. West Indies to Peru and Argentina; Galapagos Islands.

Annual; culms slender, branching, usually decumbent-spreading; sheaths glabrous or usually papillose-pilose, especially toward the summit, the collar often densely pubescent; ligule ciliate, about 0.5 mm. long; blades flat, acuminate, 5-20 cm. long, 2-7 mm. wide, scabrous and more or less papillose-pilose; spikes 10-25, 5-8 mm. long, usually spreading, falling entire; glumes acuminate, scabrous, the first 3-5 mm. long, the second 5-8 mm. long; fertile lemma 5-6 mm. long, 3-toothed, the teeth aristate, the central one minutely bifid; rudiment small, usually reduced to an awn scarcely longer than the fertile floret.



FIG. 12. *Bouteloua curtipendula*. Plant, $\times \frac{1}{2}$; spikelet and florets, $\times 5$.

Bouteloua filiformis (Fourn.) Griffiths, Contr. U. S. Nat. Herb. 14: 413. 1912. *Atheropogon filiformis* Fourn. Mex. Pl. 2: 140. 1886.

Brushy or open hillsides, sandbars, and cultivated fields, up to 900 meters; Alta Verapaz; Izabal; Jutiapa; Guatemala; Santa Rosa; Huehuetenango. Southwestern United States to Panama.

Perennial; culms in small dense tufts, simple or branching, erect or decumbent-spreading at the base, 15–50 cm. high, glabrous; sheaths glabrous or sparsely pilose; blades flat, acuminate, mostly 5–10 cm. long, 1–2 mm. wide, glabrous or pilose, the margins scabrous, usually more or less papillose-ciliate; ligule ciliate, less than 1 mm. long; spikes 5–10, ascending or spreading, mostly 1–2 cm. long, falling entire, the rachis shortly ciliate, densely pubescent at the base; glumes acuminate, subequal or the second a little longer, mostly 5–7 mm. long, glabrous, the keel scabrous to hispid; lemma about 7 mm. long, glabrous or bearded at the base, acuminate, the awns about 1 mm. long, scabrous; upper floret usually staminate, sometimes perfect, glabrous or bearded at the base, the lemma minutely bifid, the central awn thickish, 3–8 mm. long, the lateral ones more slender, a little shorter than the central.

Bouteloua glandulosa (Cerv.) Swallen, N. Amer. Fl. 17: 621. 1939. *Erucaria glandulosa* Cerv. Naturaleza 1: 347. 1870. *Bouteloua hirticulmis* Scribn. Circ. U. S. Dept. Agr. Agrost. 30: 4. 1901.

Limestone bald knobs, 500–800 meters, between Nentón and Miramar, Sierra de los Cuchumatanes (Steyermark 51472, 51485, Department Huehuetenango. Mexico.

Very similar in habit and appearance to *B. hirsuta*, differing mostly in the conspicuously papillose-hirsute culms; awns of the rudiment somewhat longer, the spike therefore more bristly.

Bouteloua pubescens Pilger, Verh. Bot. Ver. Brand. 51: 193. 1909.

Damp meadows, about 1,800 meters; Huehuetenango, San Marcos. Known only from Guatemala; described from Malacatán, *Seler* 3234, type.

Perennial; culms tufted, erect or ascending, 20–30 cm. tall, simple or sparingly branched, the lower internodes rather short; sheaths much longer than the internodes or the uppermost shorter, densely velvety-pubescent; ligule ciliate, 0.2 mm. long; blades 5–11 cm. long, 2–5 mm. wide, flat, acuminate, densely soft-pubescent or pilose, the margins papillose; spikes 6–8, ascending or spreading, falling entire, approximate, or the lower ones remote, 1–2 cm. long, the rachis scabrous; glumes acuminate, 5 mm. long, scabrous on the keels; fertile floret bearded at the base; lemma 5–6 mm. long, glabrous, acute, the nerves excurrent 1 mm., the lateral ones about 1 mm. from the summit; palea a little longer than the lemma, narrowed toward the summit, the keels approximate, scabrous; upper floret 6–7 mm. long, staminate, glabrous at the base, the lemma deeply 3-cleft, the lateral lobes very narrow, the central 2-dentate, the awns 3–4 mm. long, scabrous.

Bouteloua repens (H.B.K.) Scribn. & Merr. Bull. U. S. Dept. Agr. Div. Agrost. 24: 26. 1901. *Dinebra repens* H.B.K. Nov. Gen. & Sp. 1: 172. 1816. *Atheropogon repens* Roem. & Schult. Syst. Veg. 2: 416. 1817. *Eutriana repens* Trin. Gram. Unifl. 241. 1824.

Prairies, open ground, and rocky slopes, about 1,500 meters; Guatemala; Santa Rosa. Western Mexico to Panama.

Perennial; culms 20–50 cm. high, erect or ascending, branching; sheaths glabrous or sparsely papillose-pilose; ligule minutely ciliate, 0.5 mm. long; blades firm, flat, 8–15 cm. long, 2–5 mm. wide, glabrous or scabrous, sometimes more or less papillose or papillose-pilose; spikes 5–10, 1.5–2.5 cm. long, rather close together, appressed or spreading, falling entire; glumes acuminate, subequal, about 7 mm. long, scabrous or hispid on the keel; lemma of fertile floret 8 mm. long, the central awn 2–4 mm. long, the lateral 1.5–2 mm. long; rudiment glabrous, about 6 mm. long, deeply cleft, the awn from between the lobes 8–10 mm. long, the lateral awns much more slender and a little shorter than the central one.

Bouteloua triaena (Trin.) Scribn. Proc. Acad. Phila. 1891: 307. 1891. *Triaena racemosa* H.B.K. Nov. Gen. & Sp. 1: 179. 1816. *Eutriana triaena* Trin. Gram. Unifl. 239. 1824. *Atheropogon triaena* Spreng. Syst. 1: 293. 1825. *Triathera gracilis* Fourn. Mex. Pl. Gram. 2: 141. 1886.

Open banks and oak forests, about 195 meters; Petén; Huehuetenango. Central and southern Mexico.

Perennial; culms tufted, erect to widely spreading, 20–45 cm. tall, or in widely spreading plants as much as 80 cm. long; sheaths glabrous; ligule ciliate, 0.5–1 mm. long; blades flat, 5–20 cm. long, 1–3 mm. wide, glabrous or scabrous, the margins more or less papillose-ciliate near the base; spikes numerous, approximate on the elongate axis, spreading, short-pedicellate, falling entire, bearing a single spikelet, the axis prolonged beyond the spikelet in a rather slender bristle; glumes subacute, glabrous or scabrous, the first about 3 mm. long, the second about 5 mm. long; fertile lemma acuminate, awnless, 5–7 mm. long, glabrous or sparsely pilose; rudiment narrow, inconspicuous, not cleft, the body about 2 mm. long, the awns 6–10 mm. long, scabrous.

BRACHIARIA Griseb.

Spikelets solitary, subsessile in two rows on one side of a flattened or triangular rachis, the first glume turned toward the rachis; first glume 3–5-nerved, broad and clasping, one-third to one-half as long as the spikelet; second glume and sterile lemma equal, longer than the fruit, 5–7-nerved, glabrous or pubescent; fruit indurate, usually papillose-roughened, the margins of the lemma inrolled.

Annual, stoloniferous or decumbent-spreading grasses with flat blades and few to several racemes approximate or rather distant on a common axis.

Species about 15, in warmer regions of both hemispheres.

Brachiaria plantaginea (Link) Hitchc. Contr. U. S. Nat. Herb. 12: 212. 1909. *Panicum plantagineum* Link, Hort. Berol. 1: 206.

1827. *P. leandri* Trin. Gram. Icon. 3: pl. 335. 1836. *P. disciferum* Fourn. Mex. Pl. 2: 19. 1886.

Fields and roadsides, up to 1,500 meters; Alta Verapaz; Izabal; Guatemala; Quiché. Mexico to Bolivia and Brazil. *Grana Ban-derita*.

Annual; culms decumbent-spreading, rooting at the nodes, the ascending ends and flowering branches commonly 20–30 cm. high; sheaths compressed, keeled, glabrous, usually ciliate on the margins; ligule ciliate, about 1 mm. long; blades 5–20 cm. long, 8–12 mm. wide, rather lax, rounded at the base, the margins scabrous, sparsely ciliate near the base; racemes usually 3–6, or sometimes 1 or 2 on the branches, 3–10 cm. long, rather distant, ascending to spreading, the rachis 1–1.5 mm. wide; spikelets 4–4.7 mm. long, acute, glabrous; fruit 3–3.5 mm. long, plano-convex, subobtusate, minutely striate and papillose-roughened.

BRACHYPODIUM Beauv.

Spikelets several-flowered, subterete except in anthesis, short-pediceled, usually appressed, rather distant in simple racemes; glumes strongly nerved, the second broader and a little longer than the first; lemmas rounded on the back, obscurely nerved, awned from the tip; palea about as long as the lemma, strongly ciliate on the keels.

About 15 species, two in the mountains of tropical America, the others in the Eastern Hemisphere.

Brachypodium mexicanum (Roem. & Schult.) Link, Hort. Berol. 1: 41. 1827. *Festuca mexicana* Roem. & Schult. Syst. Veg. 2: 732. 1817. Figure 13.

Dry, open or shady banks, 2,000–3,500 meters; Jalapa; Sacatepéquez; Quezaltenango; San Marcos. Mexico; Costa Rica; Panama; Colombia and Venezuela to Bolivia.

Perennial; culms slender, wiry, branching, usually geniculate-spreading, 15–90 cm. long, sparsely pilose, densely bearded at the nodes; sheaths much shorter than the internodes, pilose; ligule 2–3 mm. long, erose-ciliate; blades 5–12 cm. or sometimes as much as 20 cm. long, 2–5 mm. wide, scabrous, sparsely to rather densely pilose on the upper surface; racemes 4–12 cm. long, sometimes reduced to one or two spikelets; spikelets 2–2.5 cm. long, 4–8-flowered, the pedicels 2–3 mm. long, densely pubescent; glumes subobtusate, the first 6–9 mm. long, the second 8–11 mm. long, glabrous; lemma of lowest floret 8–10 mm. long, scabrous at least toward the summit, the awn mostly 2–5 mm. long, or rarely as much as 1 cm. long.

BRIZA L.

Spikelets several-flowered, inflated, the rachilla disarticulating readily above the glumes and between the florets, the uppermost floret reduced; lemmas several-nerved, broad, cordate, obtuse or acute, with spreading scarious margins; palea much shorter and narrower than the lemma.



FIG. 13. *Brachypodium mexicanum*. Inflorescence, $\times 1\frac{1}{2}$.

Species about 20, three in the Old World, one in Mexico and Central America, the rest in South America.

Plants annual; panicles open, loose; lemmas obtuse *B. minor*.

Plants perennial; panicles contracted, rather dense; lemmas abruptly acute or acuminate *B. rotundata*.

Briza minor L. Sp. Pl. 70. 1753.

Moist ground along stream northwest of San Marcos, Dept. San Marcos, 2,700–3,800 meters, *Steiermark* 35738. Europe, introduced in America. Figure 14.

Annual; culms weak, erect or ascending, 10–50 cm. high; blades flat, as much as 1 cm. wide, glabrous; panicles as much as 15 cm. long, the branches stiffly ascending to spreading, the branchlets divaricate; spikelets ovate, 3–5 mm. long, 3–8-flowered, the long slender pedicels flexuous; lemmas about 3 mm. long, broad, obtuse, more or less pubescent on the middle of the back.

Briza rotundata (H.B.K.) Steud. Syn. Pl. Glum. 1: 284. 1854.
Bromus rotundatus H.B.K. Nov. Gen. & Sp. 1: 152. 1815.

Along trail between Jacaltenango and Todos Santos, Sierra de los Cuchumatanes, Dept. Huehuetenango, 1,500–2,500 meters, *Steiermark* 51869. Mexico.

Perennial; culms tufted, erect, 20–60 cm. high; sheaths glabrous, usually shorter than the internodes; blades linear, elongate, 1–3 mm. wide, scaberulous; panicles commonly 2–8 cm. long, rarely longer, rather dense, the short branches stiff or somewhat flexuous, narrowly ascending; spikelets 4–5 mm. long, nearly as broad as long, mostly 8–10-flowered; lemmas about 4 mm. long, broadly ovate, abruptly narrowed to a triangular acuminate tip, mucronate or minutely awned; palea half as long as the lemma, circular, flat.

BROMUS L.

Spikelets several-flowered, the rachilla disarticulating above the glumes and between the florets; glumes acute, the first 1- or obscurely 3-nerved, the second 3–5-nerved; lemmas keeled, 5–9-nerved, awned from between the teeth of the minutely bifid apex; palea shorter than the lemma, thin, ciliate on the keels, adherent to the caryopsis.

Slender perennials with closed sheaths, flat narrow blades, and open panicles of relatively large spikelets.

Species about 100, in temperate regions or in the tropics at higher altitudes.

First glume narrow, 1-nerved; lemmas pubescent, especially on the margins.

B. exaltatus.

First glume broader, 3-nerved; lemmas glabrous or nearly so *B. laciniatus*.



FIG. 14. *Briza minor*. Plant, $\times \frac{1}{2}$; spikelet and floret, $\times 5$.

Bromus exaltatus Bernh. Linnaea 15: Litt. 90. 1841. *B. subalpinus* Rupr. ex Fourn. Mex. Pl. 2: 128. 1886.

Open pine woods, about 3,700 meters; Huehuetenango; Sacatepéquez. Mexico; Costa Rica; Panama.

Perennial; culms erect from a more or less decumbent base, 0.5 to more than one meter high, retrorsely pilose at the nodes; sheaths longer than the internodes or the upper ones shorter, appressed- or spreading-pilose especially toward the summit; ligule membranaceous, erose, about 1 mm. long; blades flat, mostly 15–30 cm. long, 3–5 mm. wide, rarely wider, scabrous, more or less pilose toward the base; panicles 10–20 cm. long, nodding, the slender drooping branches naked below, bearing 1–3 spikelets; glumes narrow, acuminate, subequal or the second longer, the first 1- or obscurely 3-nerved, 8–12 mm. long; lemmas mostly 12–15 mm. long, acuminate, rather evenly hairy across the back, the awn 4–7 mm. or sometimes as much as 1 cm. long.

Bromus laciniatus Beal, Grasses N. Amer. 2: 615. 1896. *B. pendulinus* Sessé ex Lag. Gen. & Sp. Nov. 4. 1816. Not *B. pendulinus* Schrad., 1810. *B. proximus* Shear, Bull. Torrey Club 28: 245. 1901.

Shady ravines and pine-clad slopes, 2,500–4,200 meters; Guatemala; Sololá; Sacatepéquez; Huehuetenango; Quezaltenango; San Marcos. Mexico.

Similar in aspect to *B. exaltatus*; panicles coarser and stiffer; first glume broader, 3-nerved; lemmas glabrous or nearly so.

CALAMAGROSTIS Adans.

Spikelets 1-flowered, the rachilla disarticulating above the glumes, prolonged beyond the floret in a usually hairy bristle; glumes equal, acute or acuminate; lemma equalling the glumes or usually shorter, awned from the back, the awn straight or geniculate, often tightly twisted below the bend, the callus bearded, the hairs very short to long and copious; palea thin, shorter than the lemma.

Slender to rather coarse perennials with firm, flat or involute blades and dense or open panicles of relatively small spikelets.

Species probably about 150, in cool or temperate regions or in the tropics at higher altitudes.

Culms erect from a creeping base; blades flat at least at the base.

Sheaths much shorter than the long internodes; culms more than 1 meter high.....*C. pinetorum*.

Sheaths usually much longer than the relatively short internodes; culms not more than 60 cm. high.....*C. guatemalensis*.

Culms densely caespitose, not creeping; blades tightly involute to the base.

Ligule very short, not decurrent, at least on the lower leaves; blades densely pilose on the upper surface.....*C. vulcanica*.

Ligule prominent, decurrent; blades not pilose on the upper surface.

C. junciformis.

Calamagrostis guatemalensis Hitchc. Proc. Biol. Soc. Washington 40: 82. 1927.

Oak-pine forests, mostly 2,500–3,000 meters; Sacatepéquez (type from Volcán Agua, *A. S. Hitchcock* 9120); Quezaltenango; San Marcos.

Perennial; culms erect from a creeping base, 30–60 cm. high, simple or sparingly branching; sheaths usually longer than the relatively short internodes, glabrous or scaberulous; ligule 2–5 mm. long, obtuse, firm, decurrent; blades scabrous, firm, flat, becoming involute, 2–3 mm. wide; panicles 7–12 cm. long, dense, sometimes spikelike, the branches ascending or appressed, usually floriferous to the base; spikelets 4–5 mm. long, the glumes equal, acute, scabrous; lemma about 4 mm. long, usually scaberulous, the nerves excurrent in short teeth; awn 3–6 mm. long, attached about one-fourth above the base, geniculate, twisted below the bend, the terminal segment 3–6 mm. long; callus hairs about half as long as the lemma; rachilla 1 mm. long, the hairs 2 mm. long.

Calamagrostis junciformis (H.B.K.) Steud. Nom. Bot. ed. 2. 1: 250. 1840. *Deyeuxia junciformis* H.B.K. Nov. Gen. & Sp. 1: 143. 1815.

Near Tunimá, Sierra de los Cuchumatanes, Dept. Huehuetenango, 3,300–3,500 meters, *Steyermark* 48269. Mexico, the type from Nevado de Toluca.

Perennial; culms densely tufted, erect, about 50 cm. high, the leaves mostly crowded in a basal cluster; ligule firm, decurrent, 2 mm. long; blades slender, firm, involute, scabrous, 15–20 cm. long; panicle long-exserted, 10 cm. long, the slender somewhat flexuous branches ascending to spreading, naked below; spikelets 4–5 mm. long, the glumes acute; lemma equaling or slightly exceeding the glumes, glabrous, minutely toothed; awn attached near the middle, 4–5 mm. long, weakly geniculate, loosely twisted or contorted below the bend; callus bearded, the hairs very short and inconspicuous; rachilla one-third as long as the lemma, plumose, the hairs about 1 mm. long.

The description is based entirely on material from Guatemala which does not compare well with Mexican specimens. The differences do not seem sufficient, however, to consider the Guatemala plants distinct, at least with only the present inadequate material at hand.

Calamagrostis pinetorum Swallen, Contr. U. S. Nat. Herb. 29: 406. 1950.

Dry pine slopes, 2,100–2,500 meters; El Progreso, the type from near Finca Piamonte, *Steyermark* 43454; Zacapa.

Perennial; culms erect from a rhizome-like base, 120 cm. high, glabrous; sheaths scaberulous, the lower ones longer, the upper ones much shorter than the internodes; ligule 4.5 mm. long, obtuse, decurrent; blades 26–33 cm. long, 5–6

mm. wide, scabrous, the uppermost much shorter and narrower; panicle 16 cm. long, about 3 cm. wide, dense, interrupted below, the branches narrowly ascending, long and short ones intermixed; spikelets 5.5–6 mm. long; glumes subequal, 3-nerved, scabrous; lemma 4 mm. long, scabrous, the nerves excurrent as short awns, the awn inserted 1 mm. above the base, 3 mm. long, geniculate, tightly twisted below the bend, the callus sparsely bearded on the sides with short hairs; palea a little shorter than the lemma; rachilla 1 mm. long, bearded with appressed hairs 0.5 mm. long, bearing a rudimentary second floret 2 mm. long.

Calamagrostis vulcanica Swallen, *Phytologia* 4, no. 7: 424. 1953.

Pine forests and open places, summits of volcanos, mostly 3,000–4,600 meters; Sacatepéquez; Quezaltenango (type from Volcán de Santa María, *Skutch* 836); San Marcos. Mexico (Volcán Tacaná). Figure 15.

Perennial; culms densely tufted, erect, 40–80 cm. high; sheaths smooth or nearly so, usually longer than the internodes, the lower ones crowded; ligule very short, not visible from the side on the lower leaves; blades convolute, firm, up to 40 cm. long, more or less curved, smooth or scaberulous on the under surface, strongly nerved and rather densely pilose above, especially toward the base; panicles pyramidal, 8–14 cm. long, the slender, spreading to recurved branches in rather distant fascicles, the lower ones as much as 7 cm. long, naked below the middle; spikelets 6–7 mm. long, the glumes equal, acuminate, 3–5-nerved; lemma 5 mm. long, scabrous, the tip hyaline, the nerves excurrent, awned from about the middle of the back, the awn about 10 mm. long, geniculate, tightly twisted below the bend, appressed pilose; callus hairs dense, about 2 mm. long; rachilla 2 mm. long, densely hairy, the hairs about 2 mm. long.

Specimens of this species were formerly referred to *C. junciformis*, but are readily distinguished by the short ligule, pilose blades, and pilose awn.

CATHESTECUM Presl

Spikes falling entire, consisting of three spikelets, the lateral ones 2-flowered, staminate or sterile, rarely pistillate, the upper floret sometimes much reduced; central spikelet 3-flowered, the lower floret usually pistillate, sometimes staminate, very rarely perfect, the upper florets staminate or sterile; first glume short, that of the central spikelet usually flabellate; second glume about as long as the spikelet, acuminate, sometimes minutely lobed and mucronate; lemmas dissimilar, the lower ones cleft about one-fourth their length, the awns from between the lobes equaling or slightly exceeding them, the upper ones deeply cleft, the awns villous in the lower part, extending as much as 3 mm. beyond the lobes; in spikes wholly staminate, the lemmas all alike; palea nearly equaling the lemma, the nerves excurrent in short awns.

Annual or perennial grasses, frequently stoloniferous, with relatively short flat blades and 3 to 10 V-shaped or rhomboid, spreading spikes, evenly arranged on opposite sides of the slender flattened axis.



FIG. 15. *Calamagrostis vulcanica*. Plant, about $\times \frac{1}{3}$; spikelets, $\times 1\frac{1}{3}$; floret, $\times 6$.

Species 6, in southwestern United States, Mexico, and Central America.

Lateral spikelets with well-developed, usually staminate florets; blades, at least some of them, commonly more than 2 cm. long, often involute, not becoming curled; stolons comparatively short, conspicuously arching.....*C. erectum*.

Lateral spikelets imperfectly developed, the florets mostly sterile, the lemmas reduced; blades flat, mostly 1-2 cm. long, rarely longer, becoming curled with age; stolons long, widely spreading, not arching.....*C. brevifolium*.

Cathestecum brevifolium Swallen, Jour. Washington Acad. Sci. 27: 500. 1937. *Pastojueno*.

Moist open hillsides and rocky slopes, 200-300 meters; Zacapa. Mexico.

Perennial, stoloniferous, the stolons slender, wiry, widely spreading, the internodes as much as 12 cm. long (usually less than 10 cm.), not conspicuously arched as in *C. erectum*; culms in small dense tufts, slender, usually branching, erect or geniculate at the nodes, 5-10 cm. tall (rarely to 15 cm.), glabrous; lower sheaths crowded, glabrous or sparsely pilose with a tuft of long hairs at the mouth, the lowermost densely villous at the base; blades firm, flat, acute, becoming conspicuously curled with age, glabrous on the lower surface, scabrous and pilose on the upper, the margins scabrous, 1-2.5 cm. long (rarely to 5 cm.), 1-2 mm. wide; spikes 3-8, usually purple, spreading, dimorphous as in *C. erectum*; staminate spike: first glume narrow, 1 mm. long; second glume broader, acute or acuminate, usually glabrous or sometimes sparsely pilose on the keel, those of the lateral spikelets 2.5 mm. long, that of the central spikelet 3 mm. long, minutely lobed, mucronate; lower lemmas 3 mm. long, sparsely pilose, shallowly lobed, mucronate from between the lobes, the upper ones 2.5 mm. long, similar to the lower but with somewhat deeper lobes; pistillate spikelets: lateral spikelets imperfectly developed, the first glume 1 mm. long, the second glume acuminate, 2.5 mm. long, pilose to hirsute-villous on the keel, the florets much reduced, sterile, or the lower one rarely staminate; first glume of central spikelet similar to those of the lateral spikelets, the second 3 mm. long, minutely lobed, mucronate, hirsute-villous at least on the keel, the lower floret pistillate, the lemma 3 mm. long, sparsely pubescent on the back, the lobes one-fourth the length of the lemma, the awns from between the lobes slightly exceeding them, the upper florets staminate or neuter, the lemmas 2.5 mm. long, deeply cleft, the awns extending 1-3 mm. beyond the lobes; stamens 1.3-1.6 mm. long.

Cathestecum erectum Vasey & Hack. Bull. Torrey Club 11: 37. *pl.* 45. 1884. Figure 16.

Abundant in *arenal*, Baños de Santa Marta, north of Zacapa, about 200 meters, *Standley* 73918. Mexico; El Salvador; Honduras.

Perennial, stoloniferous, the stolons slender, wiry, conspicuously arching, the internodes elongate; culms in small dense tufts, simple or branching, erect or somewhat geniculate-spreading, 15-30 cm. tall, glabrous; lower sheaths crowded, pilose in the throat, the lowermost densely villous at the base, the upper ones more distant, glabrous; ligule ciliate, about 0.3 mm. long; blades flat or commonly



FIG. 16. *Cathespecum erectum*, $\times 1$.

loosely involute, 3–6 mm. long, 1–1.5 mm. wide, glabrous on the lower surface, scabrous and sparsely pilose on the upper; spikes usually pale, dimorphous, one form entirely staminate, the other with the lower floret of the central spikelet pistillate, the upper floret and those of the lateral spikelets staminate or neuter, the spikes all of the same kind in a single inflorescence, parts of the same plant (joined by stolons) sometimes with both kinds of spikes; staminate spikes: first glume 1 mm. long, second glume acuminate, glabrous or nearly so, that of the lateral spikelets 3 mm. long, that of the central spikelet about 4 mm. long; lemmas similar, 3 mm. long, glabrous, irregularly lobed, awnless or mucronate; pistillate spikes: glumes villous, otherwise like those of the staminate spikes; lemmas of the lateral spikelets similar, 3 mm. long, glabrous, cleft to the middle, the awns from between the lobes equaling or barely exceeding them, more or less hispid; florets of the central spikelet unlike, the lower lemma glabrous or sparsely pubescent, cleft one-third of the length, the awns from between the lobes glabrous, subequal or the central a little longer, somewhat exceeding the lobes; upper florets similar to those of the lateral spikelets, the awns slightly longer, extending 1–2 mm. beyond the lobes; anthers 2 mm. long.

CENCHRUS L.

Spikelets sessile, enclosed in spiny burs composed of united sterile branches, the burs falling entire, the body of the bur irregularly lobed, the lobes rigid, the spines barbed; spikelets 1 to several in each bur, usually glabrous; first glume narrow, 1-nerved, much shorter than the spikelet, sometimes wanting; second glume and sterile lemma nearly equal, 3–5-nerved, the lemma enclosing a palea and usually a staminate flower; fruit indurate, the lemma acuminate, the margins thin, flat.

Annual with flat blades and terminal racemes of burs.

Species about 25, in sandy or arid regions of both hemispheres.

Bristles antrorsely scabrous, much exceeding the body of the bur. *C. pilosus*.
Bristles retrorsely barbed, not exceeding the body of the bur.

Burs not more than 4 mm. wide, densely crowded in a long raceme, the lobes interlocking; first glume obsolete. *C. brownii*.

Burs 5–7 mm. wide, not crowded, the lobes usually erect; first glume present.
C. echinatus.

Cenchrus brownii Roem. & Schult. Syst. Veg. 2: 258. 1817.
C. viridis Spreng. Syst. Veg. 1: 301. 1825. *C. echinatus* var. *viridis* Spreng. ex Griseb. Fl. Brit. W. Ind. 556. 1864. Figure 17.

Thickets, open banks, fields, and waste places, to about 1,000 meters; Petén; Alta Verapaz; Izabal; Santa Rosa; Escuintla; Retalhuleu. British Honduras; Florida; West Indies; Mexico to Bolivia and Brazil.

Annual; culms erect to decumbent-spreading and rooting at the lower nodes, simple to freely branching; sheaths mostly longer than the internodes, compressed, keeled, glabrous; ligule ciliate, less than 1 mm. long; blades 10–30 cm. long, mostly 6–8 mm., or sometimes as much as 12 mm. wide, scabrous to nearly glabrous;

spikes 4–10 cm. long, dense, the axis minutely scabrous or pubescent; burs about 4 mm. wide, subtended by a ring of slender irregular bristles, the lobes pubescent, interlocking; spikelets usually 3 in each bur, 4–4.5 mm. long; first glume obsolete; second glume two-thirds to three-fourths as long as the subequal fruit and sterile lemma; fruit acuminate, minutely roughened, the nerves evident near the tip.



FIG. 17. *Cenchrus brownii*. Bur, two views of spikelet, and floret, $\times 5$.



FIG. 18. *Cenchrus echinatus*. Bur, two views of spikelet, and floret, $\times 5$.

Cenchrus echinatus L. Sp. Pl. 1050. 1753. *C. pungens* H.B.K. Nov. Gen. & Sp. 1: 115. 1815. *C. macrocarpus* Ledeb. ex Steud. Nom. Bot. ed. 2. 1: 317. 1840. *C. brevisetus* Fourn. Mex. Pl. 2: 50. 1886. *C. echinatus brevisetus* Scribn. in Millsp. Field Mus. Bot. 2: 26. 1900. *Mozote*. Figure 18.

Open banks, sand bars, fields and waste places, especially in sandy soil, up to 1,500 meters; Alta Verapaz; Izabal; Escuintla; Guatemala; Suchitepéquez; San Marcos. British Honduras; southern United States; West Indies; Mexico to Argentina.

Annual; culms erect to geniculate or decumbent-spreading, often rooting at the nodes, branching, as much as 1 meter long, glabrous; sheaths compressed, keeled, glabrous, or ciliate on the margins near the summit; ligule ciliate, 1 mm. long; blades mostly 6–20 cm. long, 3–8 mm. wide, acuminate, more or less pilose; spikes 3–10 cm. long, the axis rather stout, flexuous, scabrous; burs scarcely crowded, 4–7 cm. long, usually broader than long, pubescent, containing 3–6 spikelets, the bristles below the bur fewer and stouter than in *C. brownii*, the lobes or spines erect to spreading, retrorsely barbed at the tip; spikelets 4.5–6 mm. long; first glume small, narrow, 1-nerved, the second two-thirds to three-fourths as long as the nearly equal fruit and sterile lemma; fruit acuminate, the nerves of the lemma apparent near the tip.

Cenchrus pilosus H.B.K. Nov. Gen. & Sp. 1: 116. *pl.* 36. 1815.
C. pallidus Fourn. Mex. Pl. 2: 50. 1886.

Sand bars and rocky slopes at low altitudes; Izabal; Zacapa. Mexico; El Salvador; Nicaragua; Colombia and Venezuela to Peru.

Annual; culms 10 cm. to nearly 1 meter high, erect or decumbent at the base, simple or sparingly branching; blades rather thin, flat, scabrous, or sometimes papillose-pilose, 10–40 cm. long, 6–12 mm. wide; spikes 2–14 cm. long, dense, erect, usually long-exserted on relatively stout peduncles; body of bur about 5 mm. thick, densely pilose, the bristles antrorsely scabrous, much exceeding the bur; spikelets usually 3.

CHAETIUM Nees

Spikelets short-pedicellate, dorsally compressed, the rachilla between the glumes elongate, the bearded base of the first glume adnate to it, forming a long slender callus; glumes narrow or broad, extending into long awns; sterile lemma short-awned or awn-tipped only; fruit subindurate, the lemma acuminate, pointed or awned, the margins thin, flat, not enclosing the summit of the palea.

Perennials with flat blades and dense narrow panicles.

Species 3, one in Cuba, one in South America, and one in Mexico and Central America.

Chaetium bromoides (Presl) Benth. ex Hemsl. Biol. Centr. Amer. Bot. 3: 503. 1885. *Berchtoldia bromoides* Presl, Rel. Haenk. 1: 324. *pl.* 43. 1830. *Panicum berchtoldium* Doell in Mart. Fl. Bras. 2, pt. 2: 150. 1877. Figure 19.

Dry hills, open grassland, roadsides, and in cultivated places, 500–2,300 meters; Chiquimula; Jalapa; Santa Rosa; Guatemala; Sacatepéquez; Quiché; Quezaltenango; San Marcos. Mexico; El Salvador; Honduras; Nicaragua; Costa Rica.

Perennial; culms tufted, sometimes stoloniferous, 30–50 cm. high; sheaths smooth, pubescent on the collar, the margins ciliate; blades short or elongate, 2–6 mm. wide, firm, flat, pilose on both surfaces, sometimes sparsely so; panicles



FIG. 19. *Chaetium bromoides*, $\times \frac{3}{8}$.

5–15 cm. long, 1–2 cm. wide, dense, the branches narrowly ascending or appressed; body of spikelet about 6 mm. long, the callus 3 mm. long, the glumes broad, enclosing the florets, the awns 1.5–2.5 cm. long; fruit 4.5–5 mm. long, minutely roughened, bearing a slender awn 1–2 mm. long.

CHLORIS Swartz

Spikelets subsessile in two rows on one side of the rachis, with one perfect floret, the rachilla articulate above the glumes, prolonged beyond the fertile floret, and bearing a narrow or club-shaped rudiment composed of one or more reduced sterile lemmas; glumes narrow, 1-nerved (rarely 3-nerved), the second a little longer than the first; fertile lemma 3-nerved, awned from the back just below the usually acute tip, the callus more or less bearded on the sides, the keel glabrous or sparsely pilose, the margins usually ciliate, the hairs on the upper part often much longer than the rest.

Annual or perennial, often stoloniferous grasses, with 2–several digitate, verticillate, or subracemose spikes.

Species probably about 70, in warmer regions of both hemispheres.

Florets dark brown.

Fertile lemma minutely ciliate or glabrous on the margins. *C. petraea*.

Fertile lemma conspicuously long-ciliate on the margins. *C. ciliata*.

Florets green or pale, sometimes tinged with purple.

Rudiment broad, truncate, usually conspicuous.

Plants annual; fertile lemma long-ciliate above, the hairs as much as 4 mm. long, conspicuous; rudiment composed of 1 sterile floret *C. virgata*.

Plants perennial; fertile lemma ciliate, with short inconspicuous hairs; rudiment composed of 2 sterile florets, the lower one similar to the fertile.

C. gayana.

Rudiment narrow, acute, usually inconspicuous.

Spikelets 4–5 mm. long.

Awn of fertile lemma 10–12 mm. long; spikes relatively stout. . *C. rufescens*.

Awn of fertile lemma 5–6 mm. long; spikes slender. *C. mollis*.

Spikelets not more than 3.5 mm. long. *C. radiata*.

Chloris ciliata Swartz, Prodr. Veg. Ind. Occ. 25. 1788. *Cynodon ciliatus* Rasp. Ann. Sci. Nat. 5: 303. 1825. *Chloris propinqua* Steud. Syn. Gram. 204. 1854. *C. ciliata* var. *texana* Vasey, Bull. U. S. Dept. Agr. Bot. 12, no. 1: pl. 30. 1890. *C. texana* Nash, Bull. Torrey Club 25: 441. 1898. *C. nashii* A. Heller, Muhlenbergia 5: 120. 1909.

Black heavy soil, Corozal and Sibun River, British Honduras. Not known from Guatemala. West Indies; southern Texas; Mexico; Nicaragua; Venezuela; Colombia; Uruguay; Argentina.

Perennial; culms tufted, erect, sometimes geniculate at the nodes, 20–75 cm. (usually 30–40 cm.) tall, somewhat flattened, glabrous; sheaths rounded on the

back, or flattened and keeled toward the summit, glabrous; ligule very short, sometimes minutely ciliate; blades flat, acuminate, 5–20 cm. long, or longer on the innovations, the uppermost reduced, 3–5 mm. wide, scabrous on the margins, otherwise glabrous; spikes 3–6, 4–8 cm. long, flexuous, digitate, narrowly ascending, silvery, tinged with brown; glumes 1-nerved, the first narrow, acute, 1.3 mm. long, the second broad with hyaline margins, subobtuse, 2 mm. long, mucronate; fertile floret 2–2.5 mm. long, the callus bearded, the lemma acute, conspicuously ciliate on the keel and margins nearly to the apex with long white hairs, the awn about 1 mm. long, scabrous; rudiment club-shaped, composed of two reduced florets, the first about 1.2 mm. long, glabrous, the summit and margins hyaline, the awn 1 mm. long, the second much smaller, awnless.

Chloris gayana Kunth, Rév. Gram. 1: 89. 1829. *Rhodes grass*; "*zacate gordura*."

Probably escaped from cultivation, "La Aurora," Guatemala. Tropical America; introduced from Africa.

Perennial; culms densely tufted, commonly 1–1.5 meters tall, compressed, frequently with strong arching stolons; sheaths glabrous or scaberulous, the lower ones compressed-keeled, the upper rounded on the back, sometimes with a tuft of long hairs at the mouth; ligule membranaceous, very short, ciliate with long hairs; blades flat, usually elongate, tapering to a fine point, 3–7 mm. wide, scabrous, especially on the margins; spikes 6–20, 5–12 cm. long, narrowly ascending in a rather dense head; spikelets 4.5 mm. long; glumes acute, 1-nerved, or the second sometimes 3-nerved, scabrous on the keel, the first 1.5 mm. long, the second 2.5 mm. long, mucronate; fertile floret 3.5 mm. long, the callus bearded, the lemma acute, short-ciliate on the margins, the hairs longer on the upper third, the awn 4–6 mm. long, scabrous; rudiment composed of two reduced florets, the first similar to the fertile floret, 2.5 mm. long, glabrous, the awn 2–4 mm. long, the second small, club-shaped, awnless.

Chloris mollis (Nees) Swallen, N. Amer. Fl. 17: 596. 1939. *Gymnopogon mollis* Nees, Agrost. Bras. 427. 1829. *G. rupestre* Ridley, Jour. Linn. Soc. 27: 73. 1890. *Chloris leptanatha* Hitchc. in Urban, Symb. Ant. 7: 166. 1912. *C. rupestris* Hitchc. Misc. Pub. U. S. Dept. Agr. 243: 126. 1936.

In shade of cactus thickets, dry slopes along Río Motagua, west of Teculután, Dept. Zacapa, 250 meters, *Steyermark* 29192. West Indies; Colombia; Venezuela; Ecuador; Peru.

Annual; culms tufted, erect, or geniculate at the lower nodes, 20 cm. to more than a meter tall; sheaths rounded on the back or keeled only near the summit, glabrous or sparsely pubescent, the margins finely papillose-ciliate; ligule 0.5 mm. long, minutely ciliate; blades flat, acuminate, scabrous, 5–15 cm. long, 1–6 mm. wide; spikes 5–15 (rarely fewer), 5–12 cm. long, slender, somewhat flexuous, ascending or appressed, aggregate on an axis as much as 5 cm. long; spikelets very narrow; glumes acuminate, awn-pointed, 1-nerved, scabrous on the keel, the first 3–4 mm. long, the second 4–5 mm. long; fertile floret 4–5 mm. long, the callus bearded on the sides, the lemma shortly ciliate on the margins toward

the summit, the awn 5–6 mm. long, scabrous; rudiment very narrow, about 2 mm. long, the callus bearded, the margins ciliate near the tip, the awn about 4 mm. long, scabrous.

Chloris petraea Swartz, Prodr. Veg. Ind. Occ. 25. 1788. *Eustachys petraea* Desv. Nouv. Bull. Soc. Philom. Paris 2: 189. 1810. *Schultesia petraea* Spreng. Pl. Pugill. 2: 17. 1815. *Chloris swartzii* C. Muell. Bot. Zeit. 19: 341. 1861. *C. septentrionalis* C. Muell. Bot. Zeit. 19: 340. 1861. *C. swartziana* Doell in Mart. Fl. Bras. 2(3): 68. 1878.

Sands along the coast, British Honduras. Not known from Guatemala. Southeastern United States; eastern Mexico; West Indies; Honduras; Costa Rica; Panama.

Perennial; culms erect or sometimes decumbent at the base and rooting at the lower nodes, 30 cm. to more than 1 meter high, conspicuously flattened; sheaths broad, flattened and keeled, crowded at the base in a fan-shaped cluster; ligule very short, minutely ciliate; blades conduplicate at the base, becoming flat toward the obtuse tip, 4–20 cm. (mostly about 10 cm.) long, 4–8 mm. wide, glabrous or densely pubescent on the upper surface at the very base; spikes 2–7 (usually 4–6), 3–12 cm. (mostly 6–8 cm.) long, digitate, narrowly ascending; spikelets 2 mm. long, horizontally spreading; glumes 1-nerved, scabrous on the keel, the first 1.2 mm. long, acute, crescent-shaped, the second a little longer, broader, obtuse, notched, with an awn 0.5–1 mm. long; fertile floret dark-brown, 1.8 mm. long, the callus very short and rounded, the lemma obovate, blunt, pubescent on the keel, sparsely short-hispid on the upper half of the margins, the tip scabrous, the internerves smooth and shining, awnless; rudiment oblong-truncate, about 1 mm. long, 0.5 mm. wide, the tip scabrous.

Chloris radiata (L.) Swartz, Prodr. Veg. Ind. Occ. 26. 1788. *Agrostis radiata* L. Syst. Nat. ed. 10. 2: 873. 1759. *C. glaucescens* Steud. Syn. Pl. Glum. 1: 206. 1854. *Gymnopogon radiata* Parodi, Physis 4: 180. 1918. Figure 20.

Abundant in brushy field between Jutiapa and La Calera, Dept. Jutiapa, about 850 meters. West Indies; Mexico to Paraguay.

Annual; culms erect or decumbent at the base, branching, 15–60 cm. high, distinctly flattened; sheaths compressed-keeled, longer than the internodes, glabrous; blades thin, flat, mostly 4–10 cm. long, or the lower ones sometimes longer, smooth or scabrous, sometimes sparsely pilose; ligule 0.5 mm. long, minutely ciliate; spikes 5–15 (mostly more than 10), 4–8 cm. long, slender, straight or flexuous, subdigitate or in two or three approximate fascicles, ascending or spreading; spikelets appressed; glumes acuminate, 1-nerved, the first 1–2 mm. long, the second 2–3 mm. long, glabrous, or scabrous on the keel; fertile floret about 2.5–3 mm. long, narrow, the callus bearded, the lemma glabrous on the back, short-ciliate on the upper part of the margins, the awn 5–10 mm. long, scaberulous; rudiment very slender, 1 mm. long, glabrous, the awn 4–6 mm. long, scaberulous.



FIG. 20. *Chloris radiata*, $\times \frac{1}{2}$.

Chloris rufescens Lag. Var. Cienc. 4: 143. 1805. *C. aristata* (Cerv.) Swallen, N. Amer. Fl. 17: 596. 1939. *Agrostomia aristata* Cerv. Naturaleza 1: 345. 1870.

Open hillsides in pine-oak forest, along streets and roadsides, open ground and waste places, up to 2,000 meters; Guatemala; Quiché; Huehuetenango. Mexico; Costa Rica.

Stoloniferous perennial; culms erect or decumbent at the base, 15–75 cm. tall, compressed, sometimes branching at the lower nodes; sheaths compressed-keeled, glabrous or papillose-pilose near the summit, the margins hyaline; ligule membranaceous, 0.5 mm. long, minutely ciliate; blades flat from a conduplicate base, 4–20 cm. long, sometimes longer on the innovations, 2–4 mm. wide, scabrous, with a few long hairs on the upper surface near the base; spikes 4–9, 4–10 cm. long, digitate, or sometimes with a single spike a short distance below the others, ascending or somewhat spreading; spikelets 4 mm. long, appressed or somewhat spreading; glumes acuminate, 1-nerved, scabrous on the keel, the first 2.5 mm., the second 4 mm. long; fertile floret 3.6–4 mm. long, the callus bearded, the lemma acute, appressed-ciliate on the margins nearly to the summit, the hairs somewhat longer above, the awn about 0.8 mm. from the tip, 10–12 mm. long, scabrous; rudiment narrowly triangular, truncate, 1.2–2 mm. long, the awn 4–8 mm. long, scabrous.

Chloris virgata Swartz, Fl. Ind. Occ. 203. 1797. *C. pubescens* Lag. Var. Cienc. 4: 143. 1805. *Rabdochloa virgata* Beauv. Ess. Agrost. 84, 158. 1812. *Chloris elegans* H.B.K. Nov. Gen. & Sp. 1: 166. pl. 49. 1816. *C. alba* Presl, Rel. Haenk. 1: 289. 1830. *Agrostomia barbata* Cerv. Naturaleza 1: 346. 1870. Figure 21.

Fields and waste places, up to 1,500 meters; Izabal; Zacapa; Jutiapa; Santa Rosa; Guatemala. West Indies; central and southwestern United States and Mexico to Argentina. Also in the Old World.

Annual; culms erect, or usually decumbent at the base, sometimes rooting at the lower nodes, 10 cm. to more than 1 meter high; sheaths compressed-keeled, glabrous, mostly longer than the internodes; ligule very short, minutely ciliate; blades flat, 4–25 cm. long, 3–7 mm. wide, scaberulous or nearly smooth on both surfaces, sometimes more or less papillose-pilose on the upper surface near the base, the margins scabrous; spikes 3–15 (usually about 6), 3–9 cm. (usually 5–6 cm.) long, erect or narrowly ascending, flexuous, crowded in a rather dense silvery head; spikelets 3–3.5 mm. long; glumes acuminate, 1-nerved, scabrous on the keel, the first 1.5–2.5 mm. long, the second 2.5–3 mm. long, with an awn about 1 mm. long; fertile floret 3–3.5 mm. long, the callus bearded, the lemma acute, the keel bowed out at the middle, short-ciliate on the margins on the lower part, long-ciliate on the upper third, the hairs as much as 4 mm. long, the awn rather stout, 6–10 mm. long, scabrous; rudiment 2–2.5 mm. long, about 0.7 mm. wide, subacute, the awn 5–7 mm. long.



FIG. 21. *Chloris virgata*. Plant, $\times \frac{1}{2}$; glumes and florets, $\times 5$.

CHUSQUEA Kunth emend.

Caespitose or dumetose bamboos with determinate or indeterminate rhizomes or both; culms erect with nodding or more commonly scandent tips, rarely prostrate, the internodes not hollow, or only exceptionally so (usually by the breakdown of the pithy center in senescent culms), cylindrical, sometimes shallowly sulcate for a short distance above the insertion of the branch complement; nodes usually more or less conspicuously inflated. Culm sheaths persistent or promptly deciduous. Branches (sometimes suppressed at the lower nodes of the culm) unarmed, of two categories at each node: a single, strong central one, and numerous shorter, more slender, subequal ones arising independently, from distinct buds; branches of both kinds usually rebranched. Leaf blades typically without, exceptionally with, visibly tessellate venation. Inflorescences determinate, subspicate or thyrsoïd or paniculate racemes or compound panicles, terminal to leafy or leafless branches; spikelets supplied at the base with two empty glumes, two sterile lemmas and terminated by usually one fertile floret. Lodicules 3; stamens 3, styles usually 2. Fruit a caryopsis.

About 90 species, all native to the Western Hemisphere mainland and adjacent islands, from Mexico to Argentina and Chile, with probably the widest altitudinal range of any bamboo genus. Although the culms are generally inferior in strength and other physical properties making for versatile usefulness, those of some species are employed to an important extent in house construction and for basketry in areas of abundant natural stands. Some species yield forage of good quality, which assumes considerable importance locally for grazing horses and fattening cattle.

Five described species of this genus—four well-defined and one little-known—have been found in Guatemala. At least one additional, undescribed species is represented by numerous specimens too fragmentary to serve as type material.

Flowering material.

Leaf blades conspicuously tessellate-veined and hairy on the lower surface.

C. lanceolata.

Leaf blades not visibly tessellate-veined.

Racemes few-flowered.

Subsidiary branches verticillate, more or less completely encircling the culm at each node. *C. heydei.*

Subsidiary branches not verticillate, emerging only on one side of the culm at each node. *C. simpliciflora.*

Racemes many-flowered.

Lemmas long-aristate. *C. longifolia.*

Lemmas apiculate. *C. pittieri.*

Non-flowering material.

Leaf blades conspicuously tessellate-veined and hairy on the lower surface.

C. lanceolata.

Leaf blades not visibly tessellate-veined.

Plant spreading by long, slender, indeterminate rhizomes. . . *C. simpliciflora.*

Plant caespitose.

- Culms scarcely exceeding 1 cm. in diameter *C. heydei*.
 Culms commonly exceeding 3 cm. in diameter.
 Lower nodes of the culm bearing a ring of spine-like roots *C. pittieri*.
 Lower nodes of the culm without spine-like roots *C. longifolia*.

***Chusquea heydei* Hitchc.** Proc. Biol. Soc. Washington 40: 80. 1927.

An imperfectly known bamboo, apparently characterized by small, relatively blunt-tipped leaves and climbing stems, locally common at 1,400 meters; Jutiapa; Santa Rosa (whence the type). Sterile material from Guatemala, San Marcos, and Sacatepéquez apparently belongs here.

"Central culm as much as 5 mm. in diameter; fertile shoots in fascicles on the central culm, slender, 10 to 20 cm. long, the lower part with bladeless sheaths, the upper part with one or two foliage leaves; sheaths glabrous, finely ciliate on the collar and with a few long hairs at the sides of the summit; ligule very short; blades of fertile shoots lanceolate, thin, scaberulous, slightly hispidulous beneath at base, 2 to 5 cm. long, 4 to 8 mm. wide, cuneate but scarcely petiolate at base, acuminate at apex, with 2 more prominent veins on each side of the midrib; panicles ovoid, open, 6 to 8 cm. long, the branches single, spreading, the rachis terete, glabrous, the spikelets on branches of second or third order, all spreading; spikelets elliptic, strongly nerved, glabrous, 8 to 9 mm. long, about 2 mm. wide; glumes rounded, unequal, the second about 1 mm. long; sterile lemmas a little less than half as long as the spikelet, acutish, thin, rather weakly 3-nerved; fertile lemma acute, prominently 9-nerved, the palea a little longer." (Hitchcock, *op. cit.*)

***Chusquea lanceolata* Hitchc.**, Phytologia, 1(4): 145. 1935.

An erect to subscandent bamboo occurring at elevations of 2,000–3,300 meters (Steyermark), forming dense thickets (Standley), sometimes an element in cypress forests (Skutch); Chimaltenango (type); El Progreso; Sololá; Quezaltenango. The leaf blades have well-defined tessellate venation, a character rare in the genus.

Culms erect or subscandent, to 9.2 meters tall and 7.5 cm. in basal diameter (other characteristics of culms and those of the culm sheaths and typical branch complement unknown). Internodes of the vegetative branches hispid just below the nodes with retrorsely appressed stiff hairs which, upon falling, leave the surface aciculate and papillose, the internodes of the flowering branches (in the type) sometimes only scaberulous. Leaf sheaths compressed-keeled, salient-veined, usually strongly ciliate on the margins, the lower ones prominently hispid on the back with appressed or spreading retrorse stiff hairs which, upon falling, leave the surface aciculate and papillose, the upper sheaths dorsally glabrous or nearly so, but usually with the characteristic pubescence near the margins; auricles and oral setae lacking; petiole collar only slightly flared, the apex straight or slightly convex at the middle, the margin glabrous or minutely ciliolate; ligule asymmetrical, about 1 mm. high on one side and about 2 mm. on the other, thin, fragile, fissile, glabrous or nearly so on the back and margin;

petiole very short, scarcely exceeding 2 mm. in length, glabrous or nearly so on both surfaces or retrorsely puberulous basally on the upper surface (somewhat longer and often sparsely pilose on one or both surfaces in the type); leaf blade 4 cm. \times 8 mm. to 15 cm. \times 2.5 mm., ovate-lanceolate to oblong-lanceolate, acuminate or attenuate-acuminate above, usually broadly rounded rarely cuneate-rounded at the base, strongly cartilaginous and finely antrorse-uncinate on the margins, glabrous on the upper surface, appreciably glaucous and somewhat unevenly strewn on the outer two-thirds of the lower surface with antrorse white hairs; midrib, secondary veins and transverse veinlets pale and prominently salient on the lower surface, all except the midrib (which appears divided above into 2-3 slightly salient, scabrous veins) sunken and dark on the upper surface, where the secondary veins are scarcely distinguishable from the tertiary.

Inflorescences paniculate, terminating leafy branches, basally included in the sheath, exerted up to about 17 cm., the main axis hollow, rounded on the unbranched side, sulcate and keeled on the other, tomentose on the flat surface and antrorse scabrous on the keels, branches of all orders weakly pulvinate, second or subsecond, the main branches appressed or more or less completely spreading, up to 6 cm. distant from each other; sulcate or keeled, antrorsely scabrous, especially on the keels; secondary branches antrorsely scabrous, consisting of antrorsely spreading racemose clusters of few-several spikelets much overlapped; the pedicels very slender, stiff, 1-5 mm. long, scabrous; spikelets up to 9 mm. long, crowded, glossy throughout; empty glumes very thin, subscarious, ovate or oblong, obtuse, keelless and veinless, purplish when fresh, drying dark brown, glabrous on the back and margin, subequal, I: slightly under 1 mm. long, II: slightly over 1 mm. to 1.5 mm. long; sterile lemmas purplish when fresh, drying dark brown, lanceolate, attenuate-acuminate, 3-nerved, strongly keeled, apiculate, or awned, glabrous on the margins and throughout on the back, or more commonly antrorsely scabrous on the midrib and on both sides near the apex, and sparsely ciliate on the margins above, I: about 4 mm. long, II: about 5 mm. long including the awn; lemma lanceolate, acuminate, 7-9-nerved, strongly keeled, apiculate or awned, glabrous throughout on the back, sometimes ciliate on the margins above; palea about as long as the lemma, sometimes exerted 1-2 mm., strongly narrowed, biapiculate and often white penicillate above, broadly sulcate (scarcely keeled) below, more narrowly so or canaliculate above, usually markedly but minutely tomentose within the sulcus toward the tip, sometimes perceptibly so throughout. Empty glumes and sterile lemmas usually tinged with wine throughout, the lemmas sometimes so along the margins when fresh, the color turning dark brown upon drying. (The contents of the palea either rudimentary or decayed in the specimens available.)

Chusquea longifolia Swallen, Jour. Washington Acad. Sci. 30: 310. 1940.

A coarse, caespitose bamboo, with unusually long, narrow leaves, forming dense thickets in wet forest and cloud forest and on shaded slopes at 2,000-3,800 meters; Jalapa; Guatemala; Chimaltenango; Quezaltenango; San Marcos. Southern Mexico (whence the type); Costa Rica; Panama.

Caespitose bamboo with strictly determinate rhizomes and erect or suberect, apically arched culms up to about 15 meters tall and 6.25 cm. in basal diameter; internodes usually shallowly sulcate above the insertion of the branches, glabrous, up to 42 cm. long (XXII); nodes somewhat inflated, the lowest 3-4 with aerial roots, the lowest 1-6 without buds, the rest all gemmiferous. Culm sheaths shorter than the internodes, persistent, disintegrating in place (perfect ones not seen); auricles and oral setae apparently not developed; the ligule (in V) about 1.5 mm. long, strongly arcuate, ciliolate on the margin; sheath blade persistent, broadly triangular, appressed. Branches coarse, the principal one to 2 cm. in diameter, bulbous and rooting spontaneously at the base, the auxiliary ones very numerous, very stiff. Leaf sheath usually prominently costate, with secondary veins of variable prominence, puberulent and glabrescent, or glabrous from the first; auricles and oral setae lacking; petiole collar prominent, flared, glabrous, the apex broadly convex, the margin glabrous; ligule short, usually glabrous on the back, fragile; petiole long, thin, compressed, nerve-striate and glabrous or nearly so on both surfaces, narrowly winged on the margins by the decurrent blade; blade up to 15 cm. \times 8 mm. and 20 cm. \times 16 mm., narrowly lanceolate to linear-lanceolate, acuminate, attenuate, sometimes subulate above, narrowly cuneate at the base, stiff, flat, cartilaginous and antrorse-scabrous on the margins, scabrous to setose on one or both surfaces, sometimes glabrous or nearly so on both; midrib and secondary nerves (3-4 pairs) pale and salient on the lower surface, scarcely discernible above, the tertiary nerves salient and indistinguishable from the secondary ones on the upper surface, transverse veinlets not visible.

Inflorescences stiff, narrow racemes terminating auxiliary leafy branches, exerted up to 27 cm., the axes sulcate and ridged, scabrous, the branches appressed, not apparently pulvinate; spikelets numerous, 12-18 mm. long, overlapping, appressed or more rarely somewhat spreading; empty glumes ovate, obtuse, stramineous, glabrous, nerveless, I: 0.5 mm. long, II: 1 mm. long; sterile lemmas lanceolate, awned, scabrous above on the back, I: obtuse to acute, 7-9 mm. long, II: acute, about as long as the fertile lemma; fertile lemma up to 16 mm. long (including a 2-4 mm. long awn), scabrous on the back, glossy below, the margins involute; palea as long as the lemma (minus its awn) or a little longer, sulcate above between the weak, approximate, glabrous keels, scarious, white sericeous near the narrow, truncate apex, elsewhere glabrous and glossy, the margins wide, involute; lodicules 3, about 1 mm. long, ovate-lanceolate, obtuse, opaque, ciliate on the upper margins; anthers not seen; ovary fusiform, glabrous, style very short, stigmas 2, 2 mm. long, plumose; mature fruit not seen.

In San Marcos, where this bamboo is called *cañito* (Steyermark) the culms supply material for the fabrication of coffee baskets.

Chusquea pittieri Hack. Oesterr. Bot. Zeitschr. 53: 153. 1903.

An erect or subscandent bamboo characterized by a ring of spine-like roots above each node in the lower one-half to two-thirds of the culm. Forming dense thickets in wooded ravines, sometimes an element in oak forests, occurring at elevations of 1,500-1,800 meters; the culms locally used in making sky rockets; the plant known locally as *caña brava* (Standley). Guatemala; Sololá. Panama; Costa Rica (whence the type).

Caespitose bamboo with erect or suberect, apically pendulous or subscandent culms up to 15–18 meters tall and 7.5 cm. in basal diameter, forming relatively open clumps; internodes glabrous, often lightly pruinose when fresh, the epidermis of the basal ones often wine-colored at first, then green, relatively short (V: 15×4.8 cm.; XX: 26×3.8 cm.), shallowly sulcate above insertion of branches; nodes somewhat to rather prominently inflated, all gemmiferous or, in large plants, the lowermost 8–10 without buds; culm sheaths deciduous, longer than the internodes, leathery when fresh, papery when dry, irregularly tinted with more or less persistent wine color, strongly ribbed by coarse, salient veins, minutely and mostly retrorsely asperulous throughout and somewhat densely strewn, on the outside between the veins, with basally dark-papillate antrorsely appressed or spreading, transparent, colorless, sharp-pointed, fugaceous hairs, densely antrorse-strigose on the inside near the margins at the apex, sparsely to densely brown-ciliate on the margins above, V: gradually contracted above to a very narrow apex (about 5 mm. wide) (the apex of upper sheaths progressively more narrowly attenuate and elongate, quilled, and ending in a perceptibly thickened callus or swelling at the point of abscission of the sheath blade); auricles not developed; oral setae none or minute and fugaceous; ligule very small, scarcely integral, hardly more than a dense, crooked row of uneven, mostly short, very stiff, antrorse bristles; blade (of sheath V) more or less persistent, small, narrowly triangular, less than 10 mm. long, antrorsely appressed, quilled upon drying, fluted and antrorsely scabrous on the outside, densely dark strigose within, blades of upper sheaths progressively longer and narrower and more promptly deciduous. Primary branches up to 2 meters long, the auxiliary ones up to 30–40 cm. long, mostly branched only basally, with prominent nodes, abscissile at lower nodes; leaf sheaths compressed-keeled near the apex, salient-veined, often minutely papillose or “dewy” between the veins, ciliate on the margins; auricles lacking; oral setae several, crowded, transparent, colorless, glabrous, acute; petiole collar very straight or slightly flared, undulating at the apex, the margin fringed at first with long, transparent, colorless, glabrous, acute bristles like the oral setae, these deciduous, leaving the margin erose or irregularly toothed; ligule about 1 mm. long, thin, fissile, scabrous or subglabrous on the back, irregularly convex at the apex, irregularly dentate on the margin; petiole very short, winged almost to the base by the decurrent edges of the blade, antrorse scabrous or tomentose on the upper surface, glabrous on the lower; leaf blade 3 cm. \times 3 mm. to 10 cm. \times 10 mm. or 11 cm. \times 9 mm., narrowly lanceolate, acuminate above, cuneate at the base, with a thin, cartilaginous, antrorsely spinulose margin, glabrous throughout on the lower surface, or with a tuft of white spreading hairs on one side at the base, sparsely strewn on the upper surface with long, thin, colorless, translucent sharp-pointed, antrorsely appressed or spreading hairs, the midrib and secondary veins pale and salient, the tertiary ones weak on the lower surface, the midrib apparently divided into 2–3 strongly salient very scabrous veins on the upper surface, where the secondary and tertiary veins are sunken and scarcely distinguishable from each other.

Inflorescences terminating leafy or at length leafless twigs or branches, more or less drooping or nodding, racemose, up to 10 cm. long, relatively simple, the peduncle up to 8 cm. long, solid, glabrous, exerted about 3 cm., the main axis of the raceme deliquescent by repeated, irregular branching, the branches pulvinate and flattened at the base, glabrous or obscurely scabrous on the keels, the ultimate ones (pedicels) 5–18 mm. long; spikelets up to 13 mm. long, fusiform, overlapping

but only moderately crowded; disarticulating above empty glume II, empty glumes very small, scarious, glabrous, subequal, orbicular, obtuse, both usually less than 1 mm. long; sterile lemmas very thin, scarious, sometimes translucent, acute, scabrous-awned, glabrous or nearly so on the back, often ciliolate on the margins, sub equal, about 7-nerved, I: 4-6 mm. long, II: 5-7 mm. long; lemma 9-10 mm. long, somewhat ventricose, acute, apiculate, dorsally glabrous, ciliolate on the margins at the very apex, salient-veined with about 13 veins; palea about as long as the lemma or a little longer, slightly ventricose, glabrous, not salient-veined, obscurely sulcate below and more pronouncedly so toward the apex, bimucronate at the apex; lodicules 1-1.5 mm. long, oval to lanceolate, acute to obtuse, translucent, not prominently veined, ciliate on the margins; anthers linear, about 7 mm. long, the connective not salient above; ovary glabrous (teste Hackel); mature fruit brown, glabrous, the surface finely aciculate-striate, fusiform, slightly tapered toward the tip, crowned by the bent-over base of the style.

Chusquea simpliciflora Munro, Trans. Linn. Soc. 26: 54. *pl. II.* 1868. Figure 22.

A high-climbing or trailing bamboo with slender stems sometimes exceeding 24 meters in length, known from Guatemala by a single collection made by *Skutch* at an elevation of about 400 meters at Finca Chaila, "Zona Reyna," Quiché. The type is from the Canal Zone. The known range of the species extends from Mexico to Venezuela and Ecuador.

Clump open, spreading by slender, indeterminate rhizomes which range widely, both underground and on the surface, the culms slender, weak, depending for support on other vegetation, up to and exceeding 24 meters in length, and up to about 1 cm. in diameter, with a very long, very slender tip; internodes cylindrical, not sulcate above the insertion of the branches, up to 17 cm. long, glabrous in the lower part of the culm, covered with tiny retrorse hooks in the slender, terminal portion of the culm, the nodes more or less distinctly inflated, all gemmiferous, fringed on the sheath scar with a shaggy row of brown hairs. Culm sheaths persistent, papery, shorter than the internodes, narrowly triangular, long-attenuate above, the lower ones brown-pubescent dorsally, the upper ones glabrous or nearly so; auricles and oral setae not developed; the ligule very small and short, the margin fringed with minute, brown cilia; blade very small, quill-like or thread-like, inrolled, persistent. Branches as in the genus, the principal one at each node usually suppressed in the lower and uppermost parts of the culm, elsewhere often highly developed and reaching the dimensions of the main culm, the subsidiary branches numerous, slender, relatively short, rarely exceeding 20 cm., with prominently inflated nodes. Leaf sheaths salient-veined and compressed-keeled, hirsute throughout or in part and glabrescent, minutely papillose between the nerves, fringed along the upper margins with long cilia; auricles not developed, oral setae absent or few, slender, transparent, colorless, glabrous, appressed; petiole collar strongly flared, thin, irregularly undulate at the apex, the margin glabrous; ligule less than 1 mm. long, puberulent or nearly glabrous on the back, truncate or convex at the apex, the margin irregularly ciliolate or glabrous; petiole very short, winged to the very base by the decurrent blade, thickly cartilaginous on one edge, more or less prominently hispid on both surfaces; leaf blade 2 cm.



FIG. 22. *Chusquea simpliciflora* Munro. A, branch complement including flowering and sterile branches, ca. $\times \frac{1}{2}$; B, slender tip of flowering culm, ca. $\times \frac{1}{2}$. 1, spikelet; 2, floret with lemma removed, enlarged; 3, floret with lemma and palea removed, enlarged; 4, pistil and lodicules, enlarged. From William Munro, *Monograph of the Bambuseae*, Linn. Soc. Trans. 26: pl. 2. 1868.

× 4 mm. to 11 cm. × 12 mm., lanceolate, acute or acuminate, apiculate above, more or less asymmetrically cuneate at the base, antrorsely scabrous to the touch on the upper surface, hirsute at the base and somewhat so along the midrib on the lower surface, usually slightly paler on the lower surface, serrulate on both margins, the midrib pale and somewhat salient on both surfaces, sometimes strongly twinned and always antrorse-scabrous on the upper surface, secondary veins two or three on each side of the midrib, visible on the lower surface, not distinguishable from the tertiary veins on the upper surface, transverse veins not apparent.

Inflorescences small, open, usually very short, racemes terminating subsidiary branches, set with usually very small leaf blades, the raceme exserted 1-3 cm., bearing 1-several spikelets, the main axis very slender, striate, glabrous, the pedicels minutely pulvinate at the base, very slender, half-spreading, scaberulous; spikelets lax, pale or greenish stramineous, the empty glumes minute, unequal, obtuse, usually glabrous; sterile lemmas narrowly lanceolate, acuminate, attenuate, thin, papery, with a few prominent veins, costate, sparsely strewn with spreading hairs, or glabrous, I: 5-7 mm., II: 7-8 mm. long; fertile lemma up to 11 mm. long, thin, papery, with a few prominent veins, glabrous, acuminate, attenuate, incompletely surrounding the palea; palea about as long as the lemma or a little longer, thin, papery, keeled by two prominent veins, otherwise weak-veined, somewhat depressed between the keels, narrow, acute, truncate but not apparently bifid at the apex; lodicules 3, minute, hyaline, narrow, lanceolate, ciliolate on the margins, indistinctly nerved; anthers not seen (locules of the anthers apiculate, teste Munro); ovary slender, fusiform, glabrous; style short, glabrous, stigmas 2, plumose; mature fruit glabrous, brown, 3 mm. long and 6 mm. broad, flattened-fusiform, not sulcate.

CINNA L.

Spikelets 1-flowered, disarticulating below the glumes, falling entire; glumes equal, 1-nerved, about as long as the floret; rachilla forming a stipe below the floret, produced beyond the palea as a minute bristle; lemma similar to the glumes, 3-nerved, bearing a minute awn just below the apex; palea a little shorter than the lemma, apparently 1-keeled.

Slender to rather coarse perennials with flat blades and open, loose, drooping panicles.

Species 3, one in North America and Eurasia, one in Canada and United States, and one in Mexico to northern South America.

Cinna poaeformis (H.B.K.) Scribn. & Merr. U. S. Dept. Agr. Div. Agrost. Bull. 24: 21. 1901. *Deyeuxia poaeformis* H.B.K. Nov. Gen. & Sp. 1: 146. 1815. *Poa subuniflora* Kunth, Rév. Gram. 115. 1829. *Cinnastrum poaeforme* Fourn. Mex. Pl. 2: 91. 1886. *C. miliaceum* Fourn. Mex. Pl. 2: 91. 1886. Figure 23.

Moist pine slopes, about 3,000 meters, Volcán de Santa Maria, Quezaltenango, *Steyermark* 34099, 34167. Mexico; Costa Rica; Panama; Colombia; Venezuela; and Peru.



FIG. 23. *Cinna poaeformis*. Inflorescence, $\times 1$; spikelet, $\times 20$.

Erect perennial; culms slender to rather coarse, 80 cm. to more than 2 meters high; sheaths glabrous, shorter than the internodes; ligule 5-15 mm. long, thin, lacerate; blades 10-30 cm. long, 5-10 mm. wide, flat, acuminate, glabrous or scaberulous, the margins finely scabrous; panicles 15-40 cm. long, the slender drooping branches in distant verticils, naked in the lower half, some of them often as much as 15 cm. long; spikelets somewhat densely clustered, short-pedicellate, 2.5-2.8 mm. long; glumes usually very scabrous; awn of lemma obscure; rudiment slender, glabrous.

COIX L.

Monoecious, the staminate and pistillate spikelets in the same inflorescence; staminate spikelets 2-flowered in 2's or 3's at each joint of a slender continuous rachis, 2 sessile, the other pedicellate, sometimes wanting; first glume many-



FIG. 24. *Coix lacryma-jobi*, $\times 1$.

nerved, 2-keeled, the keels broadly winged above the middle, the margins narrow and not much inflexed; pistillate spikelets 3, together enclosed in a very hard white or grayish, bead-like involucre or modified bract, the peduncle of the staminate raceme protruding from the orifice at the apex.

Annual broad-leaved grasses with numerous inflorescences on long stout peduncles, solitary or fascicled in the upper sheaths.

Species about 4, one widely distributed in the tropics.

Coix lacryma-jobi L. Sp. Pl. 972. 1753. *Job's tears; lágrimas de San Pedro; lágrimas de Job.* Figure 24.

Wet ground along streams at low altitudes; Alta Verapaz; Suchitepéquez; Retalhuleu; Quezaltenango. Introduced from the Old World. Cultivated for ornament and sometimes as a cereal; found as an escape in moist places throughout tropical America.

Culms freely branching 1 meter or more high; blades as much as 50 cm. long, commonly 10–20 cm. at the top of the culms, 2–3.5 cm. wide, rounded or cordate, clasping at the base; staminate part of the inflorescence 2–4 cm. long, the spikelets 8–10 mm. long; beads or sheathing bracts about 1 cm. long, smooth and shining.

CRYPTOCHLOA Swallen

Inflorescence small, usually partly hidden in the upper sheaths, each bearing both staminate and pistillate spikelets in no definite arrangement; staminate spikelet: glumes and sterile lemma wanting; lemma and palea acute or acuminate, thin, the lemma 1-nerved; stamens 3; pistillate spikelet: first glume wanting; second glume and sterile lemma acuminate, subequal, 3- or usually 5-nerved, the lateral nerves approximate, finely transversely veined; fertile floret subcylindrical, raised on the enlarged and thickened segment of the rachilla; lemma firm, subindurate, smooth and shining, gradually narrowed to the blunt tip, the margins not inrolled; palea as long as the lemma, similar in texture.

Low monoecious perennial grasses with broad flat blades usually crowded toward the top of the slender wiry culms.

Four species described, in Mexico, Central and South America.

Cryptochloa granulifera Swallen, Ann. Mo. Bot. Gard. 29: 321. 1942. *Pajón.*

Wet or dense rocky forests, and dry hillsides, 600–1,400 meters; Quezaltenango; San Marcos. Mexico (Veracruz and Chiapas); Honduras; Ecuador.

Culms slender, erect, occasionally somewhat geniculate at the lower nodes, as much as 50 cm. high, pubescent in a line on one side, the nodes retrorsely pubescent, otherwise glabrous; sheaths keeled, glabrous, or pubescent toward the summit, mottled with dark spots; ligule 0.5–2 mm. long, obtuse, pubescent, fused with the auriculate summit of the sheath; blades broadly lanceolate, the upper

ones 6–7.5 cm. long, 10–13 mm. wide (sometimes 20 mm.), rather gradually narrowed to an acuminate tip, glabrous on both surfaces, the margins scabrous; panicles 2–5 cm. long, contracted, partly enclosed in the upper sheaths; staminate spikelets 4.5–5 mm. long, the lemma acuminate or subattenuate, appearing as if awned; fertile spikelet 11–12 mm. long, the second glume and sterile lemma subequal, acuminate, 5-nerved, finely transversely nerved, granular-roughened; fruit 7–8 mm. long, ivory-white, narrowed at the summit to a blunt tip.

CYMBOPOGON Spreng.

Spikelets in pairs at each node of the short, paired racemes, those of the lowest pair of one or both racemes alike, sterile, awnless, and similar to the pedicellate spikelets above; sessile fertile spikelets dorsally compressed; first glume flat or grooved, sharply 2-keeled; fertile lemma narrow, awned from between two short lobes, sometimes awnless.

Rather coarse perennials with long narrow blades and large, usually drooping, compound inflorescences of aggregate pairs of racemes subtended by spathes.

Probably about 60 species in the tropics and warmer parts of the Eastern Hemisphere.

Cymbopogon citratus (DC.) Stapf, Kew Bull. Misc. Inf. 1906: 322. 1906. *Andropogon citratus* DC. Cat. Hort. Monsp. 78. 1813, without description. DC. ex Nees, Allg. Gartenz. 3: 267. 1835. *Lemon grass*; *Té limón*; *Zacate limón*.

Probably commonly cultivated in Guatemala as in most of tropical America, although only two specimens have been seen. Introduced from India or Ceylon. Tea made from the leaves is used for colds, fevers, and various other ailments. This plant is the source of part of the lemon grass oil of commerce.

Densely tufted perennial, seldom if ever flowering in American tropics; culms erect in large clumps from short rhizomes, commonly 1–2 meters high with numerous leafy sterile shoots; sheaths crowded at the base, elongate, glabrous, the lower ones often of nearly equal length, auriculate, the auricles fused with the margins of the ligule; blades as much as 1 meter long, 5–15 mm. wide, attenuate to a fine point, gradually narrowed to a long, almost petiole-like base, scabrous, especially on the margins, the midrib rather strong toward the base; inflorescence 30–60 cm. long, drooping.

CYNODON L. Rich.

Spikelets 1-flowered, sessile in two rows on one side of the narrow triangular rachis, the rachilla disarticulating above the glumes, prolonged beyond the spikelet in a naked stipe, sometimes bearing a rudimentary floret; glumes subequal, acuminate, 1-nerved, the first lunate, the second lanceolate; lemma acute, awnless, 3-nerved, pubescent on the nerves; palea narrow, acute, as long as the lemma.

Stoloniferous perennials with short blades and few to several slender digitate spikes.

Species 6, one widely distributed in warmer regions around the world.

Cynodon dactylon (L.) Pers. Syn. Pl. 1: 85. 1805. *Panicum dactylon* L. Sp. Pl. 58. 1753. *Capriola dactylon* Kuntze, Rev. Gen. Pl. 2: 764. 1891. *Bermuda grass*; *Pelo de macho* (Izabal). Figure 25.

Common in open ground at low altitudes; sometimes planted for lawns; Petén; Izabal; Escuintla; Guatemala. British Honduras; common throughout the warmer regions of the world.

Rhizomatous, stoloniferous, widely creeping perennial; culms wiry, compressed, 10–40 cm. high; sheaths usually overlapping, keeled, glabrous or sparsely pilose at the throat; ligule membranaceous, minutely erose, 0.2–0.3 mm. long; blades flat, 2–20 cm. long (usually 5–10 cm.), 2–4 mm. wide, scabrous, especially on the margins, sometimes sparsely pilose; spikes 4–7, slender, arcuate, 2–7 cm. long; spikelets 2–3 mm. long.

DACTYLOCTENIUM Willd.

Spikelets 3–5-flowered, compressed, sessile and closely imbricate in two rows on one side of the rather narrow flat rachis; rachilla disarticulating above the first glume and between the florets; glumes broad, unequal, 1-nerved, the second mucronate or short-awned below the tip, deciduous; lemmas broad, keeled, 3-nerved, acuminate or short-awned, the lateral nerves indistinct; palea about as long as the lemma; seed subglobose, ridged, enclosed in a thin pericarp.

Annual grasses with flat blades and two to several short thick digitate ascending or spreading spikes, the rachis prolonged beyond the spikelets.

Three species in Eastern Hemisphere, one introduced in America.

Dactyloctenium aegyptium (L.) Richt. Pl. Eur. 1: 68. 1890. *Cynosurus aegyptius* L. Sp. Pl. 72. 1753. *Eleusine aegyptiaca* Desf. Fl. Atlant. 1: 85. 1798. *Dactyloctenium mucronatum* var. *erectum* Fourn. Mex. Pl. 2: 144. 1886. *Crowfoot grass*. Figure 26.

Roadsides, fields, and waste places at low altitudes; Izabal; Zacapa; Escuintla; Retalhuleu. Tropical regions of the Old World; introduced in America.

Culms branching, radiate-spreading, rooting at the nodes, the ascending ends mostly 20–40 cm. long; spikes 2–5, 1–3 cm. long, thick, digitate, the rachis produced beyond the spikelets in a stiff point; spikelets pectinate, crowded, about 3 mm. long; first glume 1.5 mm. long, acute, scabrous on the keel; second glume a little longer than the first with an awn 1–2.5 mm. long; lemmas acute or acuminate, 2.5–3.5 mm. long.



FIG. 25. *Cynodon dactylon*. Plant, $\times \frac{1}{2}$; spikelet and two views of floret, $\times 5$.



FIG. 26. *Dactyloctenium aegyptium*. Plant, $\times \frac{1}{2}$; spikelet, floret and seed, $\times 5$.

DENDROCALAMUS Nees

Caespitose bamboos with promptly determinate, thick rhizomes; culms erect or suberect, the tip nodding or broadly arched; the branches (in some species suppressed at the lower nodes of the culm) unarmed, fasciculate, very unequal, the central one at each node strongly dominant and flanked by several pairs of progressively shorter and more slender ones; culm sheaths usually promptly deciduous; leaf blades without typical tessellate venation, but often with pellucid dots or ridges between the tertiary veins. Inflorescences usually capitate, with pseudo-spikelets congested in dense, more or less spherical aggregates at the nodes of leafy or more commonly leafless branches; spikelets few-flowered, the rachilla short, usually disarticulating except below the first lemma; lodicules usually none; stamens 6, the filaments filiform, free, the style solitary, the stigma usually simple. Fruit a dry, starchy caryopsis, with a thick, separable pericarp.

About 30 species have been described, all relatively large, tropical bamboos, mostly from southeastern Asia and adjacent islands. Many are locally important as sources of materials for building and for making articles of daily use.

One species has been introduced in Guatemala.

***Dendrocalamus strictus* (Roxb.) Nees**, *Linnaea* 9: 476. 1834.
Bambusa (as *Bambos*) *stricta* Roxb., *Pl. Coromandel* 58. *pl.* 80. 1795. Figure 27.

In the opinion of Gamble (*Ann. Roy. Bot. Gard. Calcutta* 7: 79. 1896) this is the most common and most universally used bamboo of India. The species has been introduced repeatedly into the Western Hemisphere through the facilities of the United States Department of Agriculture. It has been cultivated for more than 15 years in Puerto Rico and the Federal Experiment Station at Mayaguez, whence material for trial has been introduced into Guatemala through the facilities of the Instituto Agropecuario Nacional. It is being propagated at Chocóla, Suchitepéquez, for distribution. India (whence the type).

A densely caespitose bamboo with stiff, usually upright culms, strongly varying in stature, habit and wall thickness according to the conditions of growth, up to 15 meters in height and 7.5 cm. in diameter; internodes relatively short, up to 45 cm. in length, often solid or with a very slender lumen when grown under unfavorable conditions, glabrous, usually more or less strongly pruinose when young, the nodes usually somewhat inflated, the lower ones often fringed at the sheath scar with a ring of shaggy brown hairs. Culm sheaths variable, usually relatively broad, with a gently narrowed apex, glabrous or strewn on the back with appressed or spreading pale or dark, stiff, deciduous hairs, ciliate on the margins; auricles and oral setae usually not developed; ligule straight or arcuate, 1-1.5 mm. high, dentate and ciliolate on the margin; sheath blade appressed to the culm, usually persistent, roughly triangular or ovate-triangular with an

abruptly acuminate, often hard-pointed tip, coarsely strigose on the inner surface, more sparsely strewn on the outer surface with dark, appressed, sharp, gradually deciduous hairs, or glabrous from the first. Branches stiff, wiry, the principal one at the lower nodes often short and curved downward, sometimes very long and variously curved, the secondary branches mostly very slender and numerous. Leaf sheaths nerve-striate, glabrous or hispidulous to asperous, ciliate on the margins; auricles usually not well developed, oral setae small, more or less crisped, pale, glabrous, deciduous, often lacking entirely; petiole collar often thickish, somewhat flared, the margin usually glabrous; leaf blades up to 25 cm. long and up to 30 mm. broad, linear-lanceolate, acuminate, apiculate, rounded or cuneate at the base, scabrous on the upper surface, usually more or less prominently villous on both surfaces, sometimes almost entirely without hairs in the upper part of the culm, midrib and secondary veins salient on the lower surface, the spaces between the tertiary veins more or less thickly strewn with little transverse ridges or pellucid dots often clearly visible only under a lens by transmitted light.

DIECTOMIS H.B.K.

Spikelets in pairs at the nodes of a readily disarticulating rachis, the rachis joints and pedicels narrow at the base, gradually widened and thickened to the summit, densely ciliate-villous on the margins; sessile spikelet compressed, the first glume deeply sulcate, 2-keeled, awnless, the second glume with a slender somewhat divergent awn; fertile lemma shorter than the glumes, 3-nerved, awned from between 2 small teeth, the awn once-geniculate, much longer and stouter than those of the glumes; pedicellate spikelet prominent; first glume broad, flat, many-nerved, rather abruptly acute or acuminate, bearing a slender awn from between the slender teeth of the bifid apex; second glume much shorter and narrower, acuminate.

Erect, branching annuals with solitary racemes somewhat aggregate on the branches from the upper nodes, forming a narrow but rather loose compound inflorescence. Monotypic.

Diectomis fastigiata (Swartz) H.B.K. Nov. Gen. & Sp. 1: 193. *pl.* 64. 1816. *Andropogon fastigiatus* Swartz, Prodr. Veg. Ind. Occ. 26. 1788. Figure 28.

Thickets, marshy prairies, and hillsides, to 1,500 meters; Alta Verapaz; Izabal; Zacapa; Chiquimula; Jalapa; Jutiapa; Guatemala. West Indies; Mexico to Brazil. Tropics of the Old World.

Slender annual; culms erect, commonly 0.5–1.5 meters, sometimes as little as 15 cm. high, glabrous; sheaths rounded, glabrous, shorter than the internodes; ligule 5–10 mm., rarely 20 mm. long, acuminate; blades elongate, attenuate, flat or involute, 1–4 mm. wide, scabrous; flowering branches from the upper nodes, ascending, forming a narrow, compound but rather loose inflorescence, the ultimate branchlets somewhat flexuous; racemes 2–6 cm. long, partly enclosed in the spathes; sessile spikelet 5 mm. long, the divergent awn of the second glume about 10 mm. long, that of the fertile lemma 4–5 cm. long, once-geniculate, tightly twisted below the bend; pedicellate spikelet conspicuous, 8 mm. long, minutely



FIG. 27. *Dendrocalamus strictus* (Roxb.) Nees. 1, leaf-branch, $\times \frac{1}{2}$; 2, part of flower-panicle, $\times \frac{1}{2}$; 3, culm-sheath, reduced to about $\frac{1}{4}$; 4, spikelet, enlarged; 5, flowering glume, enlarged; 6, palea, enlarged; 7, anther, enlarged; 8, ovary and style, enlarged; 9 and 10, caryopsis, enlarged; 11, leaf-sheath, enlarged. From J. S. Gamble, *Bambuseae of British India*, Calcutta Botanic Garden, *Annals* 7: pl. 68. 1907.



FIG. 28. *Diectomis fastigiata*, $\times \frac{1}{2}$.

ciliate on the margins, the awns 6–10 mm. long; second glume much narrower, 5 mm. long, acuminate.

DIGITARIA Heist.

Spikelets solitary, in pairs, or in groups of 4 or 5, alternate in two rows on one side of a 3-angled, winged or wingless raceme, the first glume turned away from the rachis; first glume wanting, or present as a small or minute nerveless scale; second glume much shorter to as long as the spikelet; sterile lemma as long as or slightly longer than the fruit, 5-nerved, the lateral nerves sometimes approximate near the margin; fruit cartilaginous, pale or dark brown, the hyaline margins of the lemma not inrolled.

Annuals or perennials with usually flat blades and slender racemes, digitate or racemose on the common axis.

Probably more than 300 species in temperate and tropical regions throughout the world.

Plants annual; culms decumbent-spreading, or if erect, freely branching at the base.

Culms widely spreading, usually rooting at the lower nodes; first glume present.

Spikelets 3 mm. long, the sterile lemma usually conspicuously villous on the margins; rachis 1 mm. wide, without scattered long white hairs.

D. sanguinalis.

Spikelets 2 mm. long, the sterile lemma subglabrous or inconspicuously pilose; rachis about 0.4 mm. wide with a few scattered long white hairs.

D. horizontalis.

Culms erect in small tufts; first glume wanting.

Spikelets 2 mm. long, villous with golden hairs. *D. argillacea.*

Spikelets 1.2–1.8 mm. long, the pubescence white.

Racemes 8–25; spikelets 1.2 mm. long. *D. multiflora.*

Racemes not more than 8; spikelets 1.5–1.8 mm. long.

Racemes 3–6, mostly less than 6 cm. long. *D. panicea.*

Racemes 6–8, mostly more than 10 cm. long. *D. cayoensis.*

Plants perennial.

Plants stoloniferous; foliage densely velvety. *D. leucites.*

Plants not stoloniferous; foliage glabrous or sparsely pilose. *D. obtusa.*

Digitaria argillacea (Hitche. & Chase) Fernald, *Rhodora* 22: 104. 1920. *Syntherisma argillacea* Hitche. & Chase, *Contr. U. S. Nat. Herb.* 18: 296. 1917.

Brushy slopes and open ground, up to 1,600 meters; Zacapa; Sacatepéquez; Guatemala. Mexico; Nicaragua; Costa Rica; Panama; West Indies.

Annual; culms 5–35 cm. high, in small dense tufts, erect or somewhat geniculate at the base, rather freely branching from the lower nodes; leaves almost

all crowded toward the base; sheaths keeled at least toward the summit, short but longer than the short internodes, or the uppermost elongate; ligule truncate, less than 1 mm. long; blades 2–7 cm. long, 2–3.5 mm. wide, flat, acuminate, sparsely to rather densely pilose or hirsute; racemes 1–4, 1–5 cm. long, stiffly ascending, racemose on a short axis, the rachis wingless; spikelets 2 mm. long, usually in pairs, unequally pedicellate; first glume obsolete; second glume and sterile lemma nearly equal, about as long as the fruit, villous with golden hairs which extend in a tuft beyond the tip of the spikelet.

Digitaria cayoensis Swallen, Jour. Washington Acad. Sci. 28: 8. 1938.

Soil pockets in stream bed, Mountain Pine Ridge, El Cayo District, British Honduras (type *Lundell* 6670). Mexico (Yucatan, *Gaumer* 2494).

Annual; culms erect or ascending, sometimes geniculate and rooting at the lower nodes, freely branching, as much as 80 cm. tall, glabrous; sheaths longer than the internodes, rounded, or keeled only toward the summit, densely hirsute, or the uppermost nearly glabrous, the hairs ascending or spreading; blades flat, acuminate, as much as 16 cm. long, 3–5 mm. wide, scabrous, the upper surface very sparsely pilose; axis of inflorescence 5–8 cm. long; racemes slender, ascending, 8–12 cm. long, pilose in the axils, the rachis 0.3 mm. wide, the very narrow margins scabrous; spikelets 1.5–1.6 mm. long, in groups of three, the unequal pedicels flattened, scabrous, 1–3 mm. long; first glume nearly obsolete; second glume about 1.3 mm. long, acute, 3-nerved, with dense lines of white hairs on the internerves and margins, the hairs near the tip somewhat longer than the others, extending slightly beyond the glume; sterile lemma a little longer than the fruit, 3-nerved, densely pubescent in lines on the internerves and margins, the hairs shorter than those on the second glume; fruit 1.4–1.5 mm. long, dark brown, striate.

Digitaria horizontalis Willd. Enum. Pl. 92. 1809. *Milium digitatum* Swartz, Prodr. Veg. Ind. Occ. 24. 1788. *Panicum horizontale* Meyer, Prim. Fl. Esseq. 54. 1818. *Syntherisma digitata* Hitchc. Contr. U. S. Nat. Herb. 12: 142. 1908. *Digitaria digitata* Urban, Symb. Antill. 8: 24. 1920. Not *D. digitata* Buese, 1854.

A common weed in cultivated ground and waste places, Petén; Alta Verapaz; Izabal; Retalhuleu. British Honduras. Tropics of both hemispheres.

Similar in habit, size, and pubescence to *D. sanguinalis*, the blades usually more densely pilose; racemes slender, racemose on a short axis rather than digitate, the rachis 0.4 mm. wide, very narrowly winged, with a few scattered, spreading, long white hairs; spikelets 2 mm. long; first glume minute or wanting; second glume about half as long as the fruit, sparsely villous at the tip; sterile lemma subglabrous or sparsely pilose or villous on the margins, the hairs short.

Digitaria leucites (Trin.) Henr. Med. Rijks Herb. Leiden 61: 6. 1930. *Panicum leucites* Trin. Gram. Pan. 85. 1826. *Milium*

velutinum DC. Cat. Hort. Monsp. 126. 1813. *Syntherisma velutinum* Chase, Proc. Biol. Soc. Washington 19: 191. 1906. *Digitaria velutina* Hitchc. op. cit., 40: 84. 1927. Not *D. velutina* Beauv. Ess. Agrost. 51, 1812, based on *Phalaris velutina* Forskal, Fl. Aegypt. Arab. 17, 1775. Figure 29.

Dry open banks, roadsides, and open ground, Jalapa; Guatemala; Sacatepéquez; Huehuetenango. Southern Mexico.



FIG. 29. *Digitaria leucites*, $\times 1$.

Stoloniferous perennial; culms erect or ascending, 20–80 cm. high; sheaths mostly longer than the internodes, densely villous, velvety; ligule membranaceous, mostly 3–4 mm. long; blades 5–9 cm. long, 3–4 mm. wide, densely villous; panicle long-exserted, with 4–10 slender ascending racemes; spikelets 2.5–3 mm. long, paired, the pairs approximate or somewhat distant; first glume minute, hyaline, nerveless; second glume and sterile lemma equal, as long as the fruit, densely villous, at least between the lateral nerves; fruit pointed, pale or purple-tinged.

Digitaria multiflora Swallen, Jour. Washington Acad. Sci. 28: 7. 1938.

Known only from the type, collected in pine-oak uplands, San Agustín, Mountain Pine Ridge, El Cayo District, British Honduras, Lundell 6730.

Annual; culms slender, erect, simple or sparingly branched, 50–115 cm. tall, glabrous; sheaths longer than the internodes, keeled, glabrous, the margins more or less pilose or ciliate toward the base; ligule membranaceous, brownish, 2–3 mm. long; blades flat, acuminate, 10–28 cm. long, 4–8 mm. wide, smooth or scaberulous on both surfaces, sparsely papillose-hirsute on the upper at least toward the base, the margins scabrous; axis of the inflorescence 8–15 cm. long; racemes 8–25, 6–15 cm. long, slender, ascending or sometimes spreading, rather evenly scattered along the axis, the rachis wingless, 0.3 mm. wide, the margins scabrous; spikelets 1.2 mm. long, in groups of 3 or 4, the unequal pedicels terete, glabrous or sparsely scabrous, 1–4 mm. long, somewhat spreading; first glume obsolete or nearly so; second glume 1 mm. long, acute, narrower than the fruit, 3-nerved, with dense lines of white pubescence on the internerves; sterile lemma a little shorter than the fruit, acute, 3-nerved, pubescent like the second glume but the hairs shorter, sometimes nearly wanting on the internerves; fruit 1.1 mm. long, extending slightly beyond the second glume and sterile lemma, acute, dark brown, striate.

Digitaria obtusa Swallen, *Phytologia* 4, no. 7: 425. 1953.

Cobán, Department Alta Verapaz, *Türkheim* 3793 (type).

Perennial; culms erect, geniculate at the lower nodes, about 50 cm. high; sheaths about as long as the internodes, glabrous, or the lower ones sparsely pilose on the margins; blades 9–13 cm. long, 3–4 mm. wide, flat, acuminate, glabrous, or sparsely pilose toward the base; racemes 5, 8–10 cm. long, stiffly ascending, spikelet-bearing to the base, pilose in the axils; spikelets mostly in 3's, crowded, 2.2 mm. long; first glume wanting; second glume and sterile lemma sparsely to rather densely pilose between the nerves with capitate hairs, the glume obtuse, 3-nerved, one-half to two-thirds as long as the fruit, the lemma 5-nerved, equaling the fruit; fruit acute, dark brown, striate.

This species has been referred to *Digitaria villosa* (Walt.) Muhl., which differs in having the racemes naked or nearly so at the base, less crowded spikelets, and longer, acute second glume. Several specimens from southern Mexico also may be referable to this species.

Digitaria panicea (Swartz) Urban, *Symb. Antill.* 8: 23. 1920.

Milium paniceum Swartz, *Prodr. Veg. Ind. Occ.* 24. 1788.

Sandy fields and along ditches, 1,500–1,600 meters. Sacatepéquez; Guatemala. Cuba; Jamaica; Hispaniola.

Annual; culms erect or ascending, 15–70 cm. high; sheaths glabrous or sparsely pilose toward the summit; blades 3–11 cm. long, rarely longer, 3–4 mm. wide, acuminate, glabrous or nearly so; racemes 3–6, 2–10 cm. long, ascending to spreading; spikelets 1.5–1.8 mm. long, ovate-elliptic; second glume and sterile lemma subequal, or the glume one-third shorter, appressed-pilose on the margins or nearly glabrous; fruit dark brown at maturity, striate.

Digitaria sanguinalis (L.) Scop. *Fl. Carn.* ed. 2. 1: 52. 1772.

Panicum sanguinale L. *Sp. Pl.* 57. 1753. *Paspalum sanguinale* Lam.

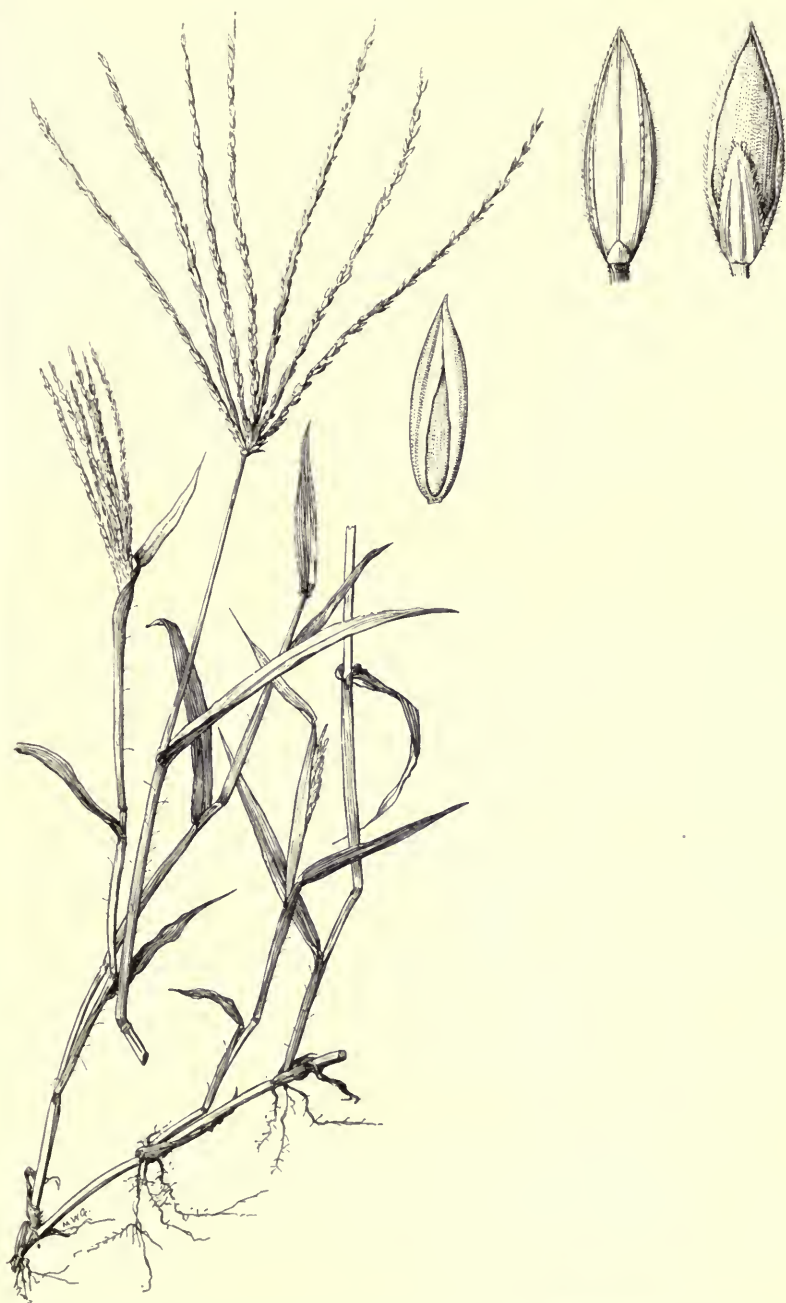


FIG. 30. *Digitaria sanguinalis*. Plant, $\times \frac{1}{2}$; two views of spikelet, and floret, $\times 10$.

Tabl. Encycl. 1: 176. 1791. *Panicum adscendens* H.B.K. Nov. Gen. & Sp. 1: 97. 1815. *Digitaria marginata* Link, Enum. Pl. 1: 102. 1821. *D. fimbriata* Link, Hort. Berol. 1: 226. 1827. Figure 30.

A common weed in cultivated ground and waste places, in warm temperate and tropical regions around the world.

Decumbent or geniculate-spreading annual; culms commonly rooting at the lower nodes, ascending, 15 cm. to more than 1 meter long; sheaths shorter than the internodes, sparsely to rather densely papillose-hirsute; ligule membranaceous, truncate, 1-2 mm. long; blades 2-10 cm. long, or sometimes longer in robust specimens, 2-9 mm. wide, scabrous, sparsely to rather densely pilose or papillose-pilose, with prominent white midnerve and margins; racemes 2-several, digitate or with a second whorl a short distance below, the rachis about 1 mm. wide, narrowly winged; spikelets 3 mm. long, the first glume small but plainly evident; second glume acuminate, about three-fourths as long as the fruit; sterile lemma slightly longer than the fruit, nearly glabrous to prominently villous on the margins.

DISTICHLIS Raf.

Dioecious perennials with creeping, scaly rhizomes, rigid culms, and dense narrow panicles; glumes broad, acute, keeled, 3-7-nerved, the nerves usually faint; lemmas closely imbricate, acute or subacute, faintly 9-11-nerved, the pistillate coriaceous, much firmer than the staminate; palea shorter to longer than the lemma, the margins bowed out below, the keels minutely ciliate, sometimes winged.

Species about 6, North and South America.

Distichlis spicata (L.) Greene, Bull. California Acad. Sci. 2: 415. 1887. *Uniola spicata* L. Sp. Pl. 71. 1753. *Briza spicata* Lam. Encycl. 1: 465. 1785. Figure 31.

Gracie Rock, Sibun River, British Honduras, *Gentle* 1623. Not known from Guatemala. Seashores and salt marshes near the coast; British Columbia; Nova Scotia; United States; Mexico (Tamaulipas, Yucatan, and Quintana Roo); Cuba; western coast of South America.

Perennial; culms stiffly erect from scaly rhizomes, mostly 10-50 cm. high; leaves numerous, the sheaths much longer than the relatively short internodes, glabrous, the blades conspicuously distichous, stiffly spreading, flat or becoming involute, commonly 3-10 cm. long; panicles dense, narrow, 1-6 cm. long; spikelets usually pale, 5-9-flowered, distinctly flattened; lemmas 3-6 mm. long, acute, glabrous; palea narrowly winged, entire.

A sterile specimen, collected on moist salt flats between Mita and Asunción Mita, 650 meters, Jutiapa, *Steyermark* 31780, may be *Distichlis stricta* (Torr.) Rydb.



FIG. 31. *Distichlis spicata*. Plant, $\times 1$; floret, $\times 5$.

ECHINOCHLOA Beauv.

Spikelets subsessile, solitary or in pairs in two rows on one side of a slender rachis, scabrous and sparsely to prominently hispid; first glume broad, triangular, acute, 3-nerved; second glume and sterile lemma nearly equal, 5-nerved, the lateral nerves approximate, mucronate, or the glume short-awned, the lemma long-awned or mucronate, sometimes enclosing a palea and staminate flower; fruit plano-convex, elliptic, minutely crested, indurate, shining, minutely striate, the margins of the lemma not inrolled, the tip of the palea not enclosed.

Slender to coarse annuals or perennials with compressed sheaths, linear blades, and few to many densely flowered racemes, distant or approximate on a main axis.

Species about 20, in warm regions of both hemispheres.

Ligule a dense line of long yellowish hairs; plants perennial.

Nodes densely bearded; awns 2–10 mm. long. *E. spectabilis*.

Nodes glabrous; awn 3–6 cm. long. *E. holciformis*.

Ligule wanting; plants annual.

Spikelets 3 mm. long, strongly hispid, the sterile lemma with an awn 1–10 mm. long; culms coarse, erect or decumbent at the base. *E. cruspavonis*.

Spikelets 2 mm. long, scabrous, sparsely and inconspicuously hispid, the second glume and sterile lemma mucronate only; culms slender, prostrate-spreading. *E. colonum*.

Echinochloa colonum (L.) Link, Hort. Berol. 2: 209. 1833. *Panicum colonum* L. Syst. Nat. ed. 10. 2: 870. 1759. *Milium colonum* Moench, Meth. Pl. 202. 1794. *Oplismenus colonum* H.B.K. Nov. Gen. & Sp. 1: 108. 1815. *Panicum zonale* Guss. Fl. Sic. Prodr. 1: 62. 1827. Figure 32.

Sand bars and moist ground, usually in waste places at low altitudes; Izabal; Zacapa. Warmer regions of both hemispheres; introduced in America.

Annual; culms slender, prostrate to erect, freely branching at the base and lower nodes, 15–70 cm. long; sheaths glabrous; ligule wanting; blades soft and rather thin, lax, 5–10 cm., rarely 15 cm., long, 3–6 mm., rarely 10 mm., wide, glabrous, the margins sparsely scabrous; inflorescence 3–10 cm. long, rarely longer; racemes few to several, ascending, the lower ones 1–2 cm. distant, 1–3 cm. long; spikelets about 2 mm. long, scabrous or finely hispid; first glume triangular, acute, about one-third as long as the spikelet; second glume and sterile lemma equal, pointed, awnless; fruit 1.8 mm. long, elliptic, acute.

Echinochloa cruspavonis (H.B.K.) Schult. Mant. 2: 269. 1824. *Oplismenus cruspavonis* H.B.K. Nov. Gen. & Sp. 1: 108. 1815. *Panicum sabulicola* Nees, Agrost. Bras. 258. 1829. *P. cruspavonis* Nees, Agrost. Bras. 259. 1829. *Oplismenus jamaicensis* Kunth, Enum. Pl. 1: 147. 1833. *Panicum crusgalli* var. *sabulicola* Doell in

Mart. Fl. Bras. 2(2): 142. 1877. *Oplismenus angustifolius* Fourn. Mex. Pl. 2: 40. 1886. *Echinochloa sabulicola* Hitchc. Contr. U. S. Nat. Herb. 17: 257. 1913. *E. crusgalli cruspavonis* Hitchc. Contr. U. S. Nat. Herb. 22: 148. 1920. *Cola de ardilla*; *caña morada*. Figure 33.



FIG. 32. *Echinochloa colonum*, $\times 1$.

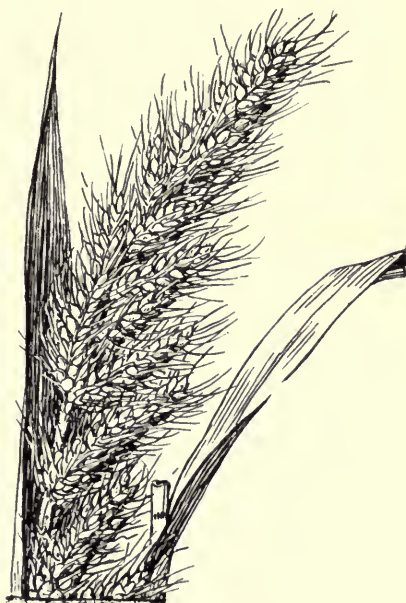


FIG. 33. *Echinochloa cruspavonis*, $\times 1$.

Ditches and lake margins, up to 1,500 meters; Alta Verapaz; Izabal; Chiquimula; Jutiapa; Guatemala. West Indies; southern United States and Mexico to Bolivia and Argentina. Warmer regions of both hemispheres.

Annual; culms soft and somewhat succulent but rather coarse, erect or decumbent at the base, compressed, glabrous, shiny, 0.5–1.5 meters high; lower sheaths longer, the upper shorter than the internodes, compressed, keeled, rather loose, glabrous; ligule wanting; blades elongate, acuminate, 5–15 mm. wide, the margins scabrous; panicles 10–20 cm. long, nodding, the branches densely flowered, the lower ones rather distant, the upper ones crowded, ascending or appressed; spikelets 3 mm. long, rather narrow, sparsely hispid on the nerves, hispidulous between the nerves; first glume broad, triangular, acute; second glume and sterile lemma equal, as long as or a little shorter than the fruit, 5–7-nerved, the glume acuminate or short-awned, the lemma with an awn 1–10 mm. long, some-

times with a palea about as long as the lemma; fruit elliptic, smooth and shining, abruptly acuminate-pointed.

Echinochloa holciformis (H.B.K.) Chase, Proc. Biol. Soc. Washington 24: 155. 1911. *Oplismenus holciformis* H.B.K. Nov. Gen. & Sp. 1: 107. 1815. *Berchtoldia holciformis* Fourn. Mex. Pl. 2: 41. 1886.

Ditches and moist places, usually in shallow water, about 1,500 meters; Santa Rosa; Guatemala. Mexico.

Perennial; culms succulent, erect, or decumbent at the base, as much as 2 meters high; sheaths glabrous, smooth; ligule a dense line of stiff hairs; blades as much as 45 cm. long, 2.2 cm. wide, or much less in small plants, scabrous on the margins; panicles 15–40 cm. long, dense, nodding; racemes usually ascending, the rachis scabrous and sparsely hispid with long hairs; spikelets 5–7 mm. long, densely hispid with short appressed hairs; awns 3–6 cm. long, very scabrous.

Echinochloa spectabilis (Nees) Link, Hort. Berol. 2: 209. 1833. *Panicum spectabile* Nees in Trin. Gram. Pan. 138. 1826.

Swamps and river margins, British Honduras (El Cayo District). Not known from Guatemala. Panama; West Indies; Colombia to Surinam, Peru, Brazil, and northern Argentina.

Coarse aquatic perennial; culms 1–2 meters tall from a long, creeping, rooting base, the nodes usually densely bearded with yellowish hairs; sheaths glabrous to papillose-hispid, the margins papillose-hispid-ciliate; ligule a dense line of stiff yellowish hairs about 4 mm. long; blades elongate, acuminate to attenuate, 1–3 cm. wide, the margins very scabrous, sparsely papillose or ciliate at the base; inflorescence 10–30 cm. long, erect, dense, the axis very scabrous and sparsely hispid; racemes usually crowded, 3–6 cm. long, ascending to spreading, the rachis hispid, especially at the base; spikelets about 5 mm. long, very short-pedicel, coarsely hispid; first glume broad, acute or short-awned, two-thirds to three-fourths as long as the spikelet; second glume acuminate; sterile lemma containing a staminate flower, the awn 2–10 mm. long; fruit 4–5 mm. long including a pointed beak about 0.5 mm. long.

ECHINOLAENA Desv.

Spikelets in pairs in two rows along one side of a flat rachis, the pairs apparently placed edgewise to the rachis, one of each pair often abortive; glumes broad, firm, acuminate, the first much longer than the second, prominently papillose-hispid, at least on the midnerve; sterile lemma broad, enclosing a nearly equal sterile palea and sometimes a staminate flower; fruit indurate, the margins of the lemma flat or inrolled only at the summit, minutely winged on both sides at the base.

Decumbent-spreading grasses with firm flat blades and solitary, divergent racemes.

Two species in Central and South America.

Echinolaena gracilis Swallen, Jour. Washington Acad. Sci. 23: 457. 1933.

Open marshy prairie near Los Amates, Department Izabal, *Weatherwax* 1601, type. Colombia; Venezuela.

Culms very slender, wiry, branching, 75–90 cm. long, appressed-pilose; sheaths of the main culm much shorter than the internodes, papillose-hispid, the margins ciliate; blades as much as 3.8 cm. long, 5 mm. wide, some of those on the secondary branches much reduced, flat, firm, pubescent or pilose above, glabrous beneath, the margins white-cartilaginous, more or less papillose-ciliate toward the base; ligule hairy, not more than 1 mm. long, sometimes scarcely evident; racemes somewhat exserted, not more than 1.8 cm. long, the rachis terminating in a spikelet; spikelets 8–11 mm. long; first glume 8–11 mm. long, that of the terminal spikelet much longer than the others, acuminate, strongly nerved, tuberculate or tuberculate-hispid, the margins ciliate; second glume 6 mm. long, acute, papillose-hispid at the summit; sterile lemma 5 mm. long, similar to the second glume, enclosing a well-developed palea; fruit 3.5 mm. long, smooth, shining.

ELEUSINE Gaertn.

Spikelets few to several-flowered, compressed, sessile in two rows on one side of a rather broad rachis; rachilla disarticulating above the glumes and between the florets; glumes shorter than the first floret, unequal, the first 1-nerved, the second 3–5-nerved, the lateral nerves approximate, close to the keel; lemmas acute, 3-nerved, the nerves close together, the uppermost somewhat reduced; seed dark brown, roughened by fine ridges, loosely enclosed in the thin pericarp.

Annual grasses with two to several racemes digitate at the summit of the culms, sometimes with one or two a short distance below.

Species about 6, one in South America, the others in the Eastern Hemisphere, one introduced in America.

Eleusine indica (L.) Gaertn. Fruct. & Sem. 1: 8. 1788. *Cynosurus indicus* L. Sp. Pl. 72. 1753. *Eleusine gracilis* Salisb. Prodr. Stirp. 19. 1796. *E. domingensis* Sieber ex Schult. Mant. 2: 323. 1824. Not *E. domingensis* Pers., 1805. *Cynodon indicus* Raspail, Ann. Sci. Nat. Bot. 5: 303. 1825. *Eleusine scabra* Fourn. ex Hemsl. Biol. Centr. Amer. Bot. 3: 565. 1885, name only; Fourn. Mex. Pl. 2: 145. 1886. *E. indica* var. *major* Fourn. Mex. Pl. 2: 145. 1886. Figure 34.

A common weed, roadsides, fields, and waste places, up to 1,000 meters; Petén; Alta Verapaz; Izabal; Santa Rosa; Escuintla; Guatemala; Huehuetenango. Warm regions of both hemispheres.

Culms in tough spreading clumps, somewhat decumbent at the base, 15–70 cm. or rarely as much as 1 meter high, compressed, very smooth, sheaths compressed, sharply keeled, sparsely papillose near the margins toward the summit, otherwise glabrous, the margins hyaline; ligule membranaceous, erose, about

1 mm. long; blades as much as 25 cm. long, 2–8 mm. wide, flat or conduplicate, the tip navicular, glabrous or sparsely pilose on the upper surface, the margins scabrous; spikes 2–several, 5–10 cm. long, stiffly ascending; spikelets 5 mm. long; lemmas 3 mm. long, broad at the base, rather abruptly narrowed to the subacute apex, sometimes mucronate.

ELYONURUS Humb. & Bonpl.

Spikelets in pairs, alike in size and shape, at the nodes of a tardily disarticulating rachis, one sessile, perfect, the other pedicellate, staminate, the rachis joints and pedicels thickened, densely villous; glumes rather firm, rounded on the back, sharply keeled, acuminate, entire or bifid, the margins inflexed, clasping the second glume; second glume acuminate; sterile lemma hyaline, narrow, nearly as long as the glumes; fertile lemma hyaline, awnless, the palea obsolete.

Tufted erect perennials with narrow or involute blades and solitary, terminal, often woolly racemes.

Species about 15, in warmer regions of both hemispheres.

Elyonurus tripsacoides var. **ciliaris** (H.B.K.) Hack. in DC. Monog. Phan. 6: 333. 1889. *E. ciliaris* H.B.K. Nov. Gen. & Sp. 1: 193. 1816.

Prairies, rocky hillsides, meadows, and roadsides, 1,000–1,600 meters; Jutiapa; Guatemala; Sacatepéquez; Huehuetenango. Mexico; Panama; Colombia and Venezuela.

Perennial; culms densely tufted, erect, 60–100 cm. high, glabrous, sometimes with a pubescent line down one side; sheaths shorter than the internodes, rounded, glabrous, or papillose-pilose or villous toward the summit; ligule membranaceous, minutely ciliate, less than 0.5 mm. long; blades elongate, 1–3 mm. wide, flat or folded, usually villous on the upper surface at the base, the margins scabrous; raceme 5–12 cm. long, the rachis and pedicels densely villous; sessile spikelet 5–8 mm. long; first glume pubescent or villous, the margins densely short-ciliate, winged toward the summit, the tip deeply bilobed, the lobes narrow, acuminate; pedicellate spikelet similar to the sessile but slightly smaller and not as deeply lobed.

ERAGROSTIS Host

Spikelets few- to many-flowered, the rachilla disarticulating above the glumes and between the florets, or continuous, the lemmas deciduous, the paleas persistent; glumes acute or acuminate, 1-nerved, or the second rarely 3-nerved, much shorter than the spikelet; lemmas acute or acuminate, keeled or rounded on the back, 3-nerved, the nerves prominent or sometimes obscure; palea 2-nerved, often ciliate on the keels.

Annuals or perennials with open or contracted panicles of small or rather large spikelets.

Species about 200, in temperate and tropical regions of the world.



FIG. 34. *Eleusine indica*. Plant, $\times \frac{1}{2}$; spikelet, floret, and seed, $\times 5$.

Plants annual.

Palea prominently ciliate on the keels. Low delicate grasses.

Panicles open, loosely flowered, the branches spreading *E. amabilis*.

Panicles dense or spike-like.

Culms and panicles conspicuously viscid, the panicle branches stiffly ascending or spreading *E. viscosa*.

Culms and panicles not viscid, the panicles spike-like, the branches appressed *E. ciliaris*.

Palea not prominently ciliate on the keels.

Culms creeping, freely branching, forming dense soft mats *E. hypnoides*.

Culms erect or ascending, not forming mats.

Panicles long, narrow, dense; spikelets pale, 2-3 mm. long, the lemmas thin, about 1 mm. long *E. glomerata*.

Panicles open; spikelets usually more than 3 mm. long, the lemmas firm.

Plants with glandular depressions on the keel of the lemmas or the keel of the sheaths.

Spikelets 2.5 mm. wide; glands prominent on the keel of the lemmas.
E. cilianensis.

Spikelets 1.5 mm. wide; keel of the sheaths with numerous glands.
E. glandulosa.

Plants not glandular.

Spikelets pale, tinged with red or reddish brown (see also *E. mexicana*), subsessile, fascicled on the branches.

Lemmas 2-2.5 mm. long, abruptly acute; spikelets mostly 6-10 mm. long *E. maypurensis*.

Lemmas 5 mm. long, gradually narrowed from the base; spikelets 10-30 mm. long *E. simpliciflora*.

Spikelets grayish-green, pedicellate in open panicles.

Spikelets and branchlets appressed along the primary panicle branches *E. diffusa*.

Spikelets and branches usually spreading.

Plants delicate; spikelets grayish-green, about 1 mm. wide.
E. tephrosanthos.

Plants coarser, usually more than 25 cm. high; spikelets reddish, 1.5 mm. wide *E. mexicana*.

Plants perennial.

Spikelets, at least the lateral ones, subsessile or short-pedicellate, usually crowded on the branches.

Spikelets 1.5 mm. wide, scarcely crowded *E. bahiensis*.

Spikelets 1 mm. wide, crowded.

Culms 15-60 cm. high, slender; spikelets 4-5 mm. long, 6-12-flowered.
E. acutiflora.

Culms 1-2 meters high, relatively stout; spikelets 5-10 mm. long, 10-16-flowered *E. domingensis*.

Spikelets long-pedicellate, usually spreading, in open, diffuse panicles.

Lemmas keeled, the nerves prominent *E. elliottii*.

Lemmas rounded on the back, the nerves obscure.

Lateral pedicels usually shorter than the spikelets; panicles relatively narrow, elongate, much longer than wide; sheaths villous, at least toward the summit.

Blades as much as 40 cm. long, becoming involute at least in the upper part *E. hirta*.

Blades 15–25 cm. long, flat *E. praetermissa*.

Lateral pedicels much longer than the spikelets; panicles diffuse, sometimes nearly as broad as long; sheaths glabrous or more or less pilose or hirsute.

Spikelets about 1 mm. wide; lemmas 1.3–1.5 mm. long. Panicles fragile. *E. lugens*.

Spikelets about 1.5 mm. wide; lemmas 1.8–2 mm. long.

Blades 1–4 mm. wide; culms 40–80 cm. high *E. intermedia*.

Blades 5–10 mm. wide; culms usually more than 1 meter high. *E. hirsuta*.

Eragrostis acutiflora (H.B.K.) Nees, Agrost. Bras. 501. 1829.

Poa acutiflora H.B.K. Nov. Gen. & Sp. 1: 161. 1816.

Fields and pinelands at lower altitudes; Petén; Jutiapa. British Honduras; Mexico; Honduras; Colombia and Venezuela to Bolivia and Brazil.

Perennial; culms tufted, erect, 15–60 cm. high; sheaths glabrous, more or less hairy in the throat, mostly shorter than the internodes; blades rather firm, mostly 5–20 cm. long, 2–4 mm. wide, glabrous or sparsely pilose; panicles 8–30 cm. long, the branches stiffly ascending to spreading, the lower ones sometimes as much as 10 cm. long, pilose in the axils; spikelets 4–5 mm. long, 6–12-flowered, rarely more, short-pedicellate, usually crowded, appressed; lemma about 2 mm. long, acute or subacuminate, scabrous on the keel near the summit.

Eragrostis amabilis (L.) Wight & Arn. ex Nees in Hook. & Arn. Bot. Beechey Voy. 251. 1838. *Poa amabilis* L. Sp. Pl. 68. 1753. *P. plumosa* Retz. Obs. Bot. 4: 20. 1786. *Eragrostis plumosa* Link. Hort. Berol. 1: 192. 1827.

Pastures and waste places at low altitudes; Izabal; Escuintla; Retalhuleu. British Honduras. A common weed in warmer regions of the world.

Annual; culms slender, erect or geniculate-spreading, 10–40 cm. high; blades flat, 4–10 cm. long, 2–4 mm. wide, acuminate, glabrous; sheaths glabrous, with a prominent tuft of hairs at the throat; panicles oblong, 3–12 cm. long, 1.5–3 cm. wide, the short branches stiffly ascending or spreading, 1–2.5 cm. long; spikelets mostly 1.5–2 mm. long, 4–6-flowered; lemmas 1 mm. long, obtuse, the palea conspicuously ciliate, the hairs about 0.3 mm. long.



FIG. 35. *Eragrostis cilianensis*. Plant, $\times 1$; spikelet, $\times 5$; floret, $\times 10$.

Eragrostis bahiensis Schrad. in Schult. Mantissa 2: 318. 1824.

Wet or boggy meadows, 900–1,800 meters, Huehuetenango. Brazil.

Perennial; culms erect, commonly 30–70 cm. high, glabrous; sheaths rounded, longer or usually shorter than the internodes, glabrous, or somewhat hairy on the collar; blades firm, mostly 6–12 cm. long, 2–4 mm. wide, tapering to a rather fine point, pilose on the upper surface near the base; panicles 10–15 cm. long, the few branches stiffly ascending, floriferous to the base or nearly so, the branchlets appressed; spikelets 4–7 mm. long, short-pedicellate, appressed; glumes subequal, about 2 mm. long, acute, the second sometimes 3-nerved; lemmas 2 mm. long, ovate, acute, rather abruptly narrowed about the middle.

Eragrostis cilianensis (All.) Link ex Vign. Malpighia 18: 386. 1904. *Poa cilianensis* All. Fl. Pedem. 2: 246. 1785. *Eragrostis major* Host, Icon. Gram. Austr. 4: 14. pl. 24. 1809. *E. megastachya* Link, Hort. Berol. 1: 187. 1827. Figure 35.

Sand bars and waste places; Izabal; Zacapa; Santa Rosa; Retalhuleu. Southern Canada to Argentina. Introduced from Europe.

Annual; culms commonly 15–60 cm. tall, or in dwarf plants as little as 1 cm., erect or geniculate-ascending, branching; sheaths keeled, more or less pilose at the mouth, with rather prominent glandular depressions on the keel; blades usually 3–15 cm. long, 2–7 mm. wide, acuminate, glabrous, with prominent glandular papillae on the margins; panicles 3–15 cm. long, rather dense, the branches stiffly ascending or spreading, spikelet bearing to the base; spikelets oblong, 5–15 mm. long, 2.5–3 mm. wide, 10–40-flowered, short-pedicellate, usually divergent; glumes 2 mm. long, acute; lemmas obtuse or subacute, about 2.5 mm. long, the keel scabrous and bearing a few prominent glands.

Eragrostis ciliaris (L.) R. Br. in Tuckey, Narr. Exp. Congo App. 478. 1818. *Poa ciliaris* L. Syst. Nat. ed. 10. 2: 875. 1759.

Fields and waste places, to about 1,500 meters; Petén; Izabal; Zacapa; Santa Rosa; Escuintla; Guatemala; Retalhuleu; Quezaltenango. Common in warm and tropical regions of both hemispheres. Figure 36.

Annual; culms slender, branching, erect to decumbent-spreading, 10–40 cm. or rarely as much as 60 cm. high; sheaths glabrous or sparsely papillose-pilose, with a tuft of long hairs at the throat; blades flat, acuminate or attenuate, 4–10 cm. long, 2–4 mm., rarely 5 mm., wide, glabrous or sparsely pilose with long hairs; panicles dense, spikelike, interrupted toward the base, 5–12 cm. long; spikelets 2–3 mm. long, 6–10-flowered, nearly sessile; lemmas 1 mm. long; palea conspicuously ciliate on the keels, the hairs about 0.5 mm. long.

Eragrostis diffusa Buckl. Proc. Acad. Nat. Sci. Phila. 1862: 97. 1862. *E. purshii* var. *diffusa* Vasey, Contr. U. S. Nat. Herb. 1: 59. 1890.

Moist fields, about 200 meters; Zacapa. Southwestern United States; Mexico.

Annual; culms erect or ascending, sparingly branching, mostly 30–50 cm. high; sheaths glabrous with prominent tufts of hairs at the throat; blades commonly 5–10 cm. long, 1–3 mm. wide, attenuate, flat; panicles 5–20 cm. long, the relatively short spreading branches densely flowered, the secondary branches



FIG. 36. *Eragrostis ciliaris*. Plant, $\times \frac{1}{2}$; spikelet, $\times 5$; floret, $\times 10$.

appressed; spikelets linear, 5–8 mm. long, often longer than the pedicels; lemmas acute, the nerves evident, the lower ones about 2 mm. long.

Eragrostis domingensis (Pers.) Steud. Syn. Pl. Glum. 1: 278. 1854. *Poa domingensis* Pers. Syn. Pl. 1: 88. 1805. *Eragrostis maxima* Fourn. Mex. Pl. 2: 114. 1886.

Common on sand dunes near San José, Escuintla, *Standley* 63965. British Honduras; Mexico (Oaxaca, Yucatan, Chiapas) to Colombia; West Indies.

Perennial; culms relatively stout, erect, mostly 1–2 meters high, frequently with a few branches from the middle nodes; sheaths firm, usually longer than the internodes; blades firm, flat, elongate, attenuate, as much as 7 mm. wide, smooth beneath, scabrous on the upper surface and on the margins; panicle narrow, dense, elongate, the branches ascending or appressed, floriferous to the base; spikelets 5–10 mm. long, 10–16-flowered, appressed, the pedicels much shorter than the spikelets; glumes acute, about 1 mm. long; lemmas 1.8–2 mm. long, acute, palea nearly as long as the lemma.

Eragrostis elliottii S. Wats. Proc. Amer. Acad. Sci. 25: 140. 1890. *Poa nitida* Ell. Bot. S. C. & Ga. 1: 162. 1816. *Eragrostis nitida* Chapm. Fl. South. U. S. 564. 1860. Not *Eragrostis nitida* Link, Hort. Berol. 1: 193. 1827.

Moist or swampy places in pine forests. British Honduras; southeastern United States; eastern Mexico; West Indies.

Perennial; culms tufted, erect, 30–80 cm. high; sheaths longer than the internodes, glabrous, with a tuft of hairs at the mouth; blades elongate, attenuate, flat, 1–4 mm. wide, scabrous on the upper surface; panicles usually more than half the height of the culms, the fragile branches stiffly ascending to spreading, few-flowered; spikelets mostly 4–7 mm. long, on long, capillary, spreading pedicels; lemmas 2 mm. long, ovate, abruptly acute, closely imbricate.

Eragrostis glandulosa Harvey, Bull. Torrey Club 81: 406. 1954.

Damp thickets, 1,400–1,700 meters; Jalapa; Sacatepéquez. Mexico (Guerrero and Jalisco).

Annual; culms erect or ascending, 60 cm. to as much as 2 meters high, sparingly branching; sheaths mostly longer than the internodes, compressed, keeled, papillose-ciliate, with conspicuous tufts of hairs at the throat, the keel with numerous glandular depressions; blades as much as 50 cm. long, 6–14 mm. wide, scabrous on the upper surface, smooth or nearly so beneath; panicles 25–40 cm. long, the scabrous branches stiffly ascending to spreading, the lower ones as much as 15 cm. long; spikelets 2–8-flowered, 2–5 mm. long, 1–2 mm. wide, green, tinged with purple; glumes narrow, acute or acuminate; lemmas ovate, acute, the nerves obscure, the lowest about 1.8 mm. long.

Eragrostis glomerata (Walt.) L. H. Dewey, Contr. U. S. Nat. Herb. 2: 543. 1894. *Poa glomerata* Walt. Fl. Carol. 80. 1788. *P.*

conferta Ell. Bot. S. C. & Ga. 1: 158. 1816. *Eragrostis conferta* Trin. Mém. Acad. St. Pétersb. VI. Math. Phys. Nat. 1: 409. 1830. Figure 37.

Common on recently formed sand bar along Montagua River near ruins of Quiriguá, Dept. Izabal. Southeastern United States; Mexico; El Salvador; Honduras; Colombia and Venezuela to Bolivia and Argentina.

Coarse annual; culms erect, 10 cm. to as much as 1 meter high, rarely more, hard and somewhat woody, usually freely branching; sheaths about as long as the internodes, loose, keeled, glabrous; blades flat, elongate, attenuate, 3–8 mm. wide; panicles 5–50 cm. long, narrow, the short branches narrowly ascending or appressed, densely flowered to the base; spikelets short-pedicellate, 6–8-flowered, 2–3 mm. long, the glumes minute; lemmas thin, about 1 mm. long.

Eragrostis hirsuta (Michx.) Nees, Agrost. Bras. 508. 1829. *Poa hirsuta* Michx. Fl. Bor. Amer. 1: 68. 1803.

Locally abundant in sandy pine-oak uplands, San Agustin, Mountain Pine Ridge, El Cayo District, British Honduras, *Lundell* 6738. Southeastern United States; Mexico (Tamaulipas).

Perennial; culms erect, tufted, as much as 120 cm. high; sheaths longer than the internodes, hirsute to glabrous, pilose at the throat; blades elongate, attenuate, scabrous, 5–10 mm. wide; panicles usually more than half the height of the plant, diffuse, the branches rather stiffly ascending to spreading, pilose in the axils with long hairs; spikelets 2–6-flowered, the pedicels usually long and somewhat flexuous; glumes 1.5–2 mm. long, acuminate; lemmas 2 mm. long, acute, the nerves obscure.

Eragrostis hirta Fourn. Mex. Pl. 2: 115. 1886.

Rocky slopes, about 1,900 meters; Sacatepéquez; Chimaltenango; Huehuetenango. Mexico; Honduras.

Perennial; culms tufted, erect, 60–100 cm. high; sheaths longer than the internodes, the lower ones sometimes elongate, rather densely villous at least toward the summit; blades as much as 40 cm. long, 2–5 mm. wide, scabrous and sparsely papillose-pilose on the upper surface; panicles 30–45 cm. long, the branches usually narrowly ascending, pilose in the axils; spikelets 4–8-flowered, 3–5 mm. long; glumes subequal, acute, 1.6–1.8 mm. long; lemmas ovate, acute, about 2 mm. long, the nerves obscure or the lateral ones evident.

Eragrostis hypnoides (Lam.) B.S.P. Prel. Cat. N. Y. 69. 1888. *Poa hypnoides* Lam. Tabl. Encycl. 1: 185. 1791. *Megastachya hypnoides* Beauv. Ess. Agrost. 74, 167, 175. 1812. *Poa reptans* var. *caespitosa* Torr. Fl. North. and Mid. U. S. 1: 115. 1823. *Neeragrostis hypnoides* Bush, St. Louis Acad. Sci. Trans. 13: 180. 1903. *Erosion hypnoides* Lunell, Amer. Midl. Nat. 4: 221. 1915. Figure 38.



FIG. 37. *Eragrostis glomerata*. Panicle, about $\times \frac{1}{2}$; spikelet and floret, $\times 12$.

Sandy river banks, lake shores, moist ground along ditches and trails at low altitudes; Petén; Alta Verapaz; Izabal; Zacapa. British Honduras; West Indies; United States; Mexico to Bolivia, Argentina, and Brazil.



FIG. 38. *Eragrostis hypnoides*. Plant, $\times \frac{1}{2}$; floret, $\times 10$.

Stoloniferous, widely spreading annual, forming dense mats; culms very slender, 5-10 cm. high; blades 1-2 cm. long, flat or becoming loosely involute, stiffly spreading; panicles pale, dense, subcapitate, 1-2 cm. long, nearly as broad; spikelets 5-12 mm. long, few- to many-flowered, on short stiff pedicels; glumes unequal, the first 1 mm. long, the second 1.5 mm. long, broader than the first; lemmas 1.5-2 mm. long, acute, rather broad at the base with thin margins; anthers 0.2 mm. long.

Eragrostis intermedia Hitchc. Jour. Washington Acad. Sci. 23: 450. 1933.

Sand flats, dry hills, and rocky slopes, 1,500–2,000 meters; Izabal; Jalapa; Guatemala; Sololá; Huehuetenango; Quezaltenango. Southwestern United States; Mexico.

Perennial; culms tufted, erect, mostly 40–80 cm. high; sheaths glabrous or the lower sometimes sparsely pilose, conspicuously pilose at the throat; blades as much as 25 cm. long, 1–4 mm. wide, attenuate, more or less pilose on the upper surface toward the base; panicles diffuse, commonly 15–35 cm. long, the branches ascending to spreading, pilose in the axils or rarely glabrous; spikelets 3–8-flowered, 3–10 mm. long, about 1.5 mm. wide, the pedicels longer than the spikelets; glumes rather narrow, acute, 1–1.5 mm. long; lemmas 1.8–2 mm. long, acute, obscurely nerved.

***Eragrostis lugens* Nees, Agrost. Bras. 505. 1829.**

Prairies and meadows, 1,400–1,800 meters; Guatemala; Huehuetenango. Florida, Louisiana, and Texas; Mexico; Venezuela to Brazil and Argentina.

Perennial; culms in small tufts, erect or ascending, 20–60 cm. high; leaves mostly crowded toward the base, the sheaths glabrous or sparsely pilose, hairy at the throat; blades mostly 5–15 cm. long, sometimes longer, 1–3 mm. wide, tapering to a fine, somewhat flexuous tip; panicles long-exserted, 8–30 cm. long, commonly 15–20 cm., diffuse, the slender branches ascending to spreading; spikelets 2–4 mm. long, about 1 mm. wide, 3–8-flowered, the pedicels long and capillary, the florets closely imbricate; glumes thin, 0.7–1.2 mm. long; lemmas 1.3–1.5 mm. long, ovate, abruptly acute.

***Eragrostis maypurensis* (H.B.K.) Steud. Syn. Pl. Glum. 1: 276. 1854. *Poa maypurensis* H.B.K. Nov. Gen. & Sp. 1: 161. 1816.**

Open hillsides, clearings, and waste places, to about 1,000 meters; Izabal; Chiquimula; Guatemala. British Honduras; southern Mexico to Bolivia and Brazil.

Annual; culms erect or decumbent at the base, 10–40 cm. or sometimes as much as 65 cm. high; sheaths glabrous, shorter than the internodes; blades flat, attenuate, mostly 6–15 cm. long, rarely longer, 2–4 mm. wide, papillose-pilose, especially on the upper surface, or nearly glabrous; panicles 8–15 cm. long, erect, the somewhat distant solitary branches stiffly ascending, spikelet bearing nearly to the base, densely pilose in the axils; spikelets 6–10 mm. long, 8–28-flowered, short-pedicellate, somewhat spreading, usually tinged with red or purple; glumes acuminate, as long as the lowest floret; lemmas 2–2.5 mm. long, broad at the base, rather abruptly narrowed above the middle to an acute or acuminate tip.

***Eragrostis mexicana* (Hornem.) Link, Hort. Berol. 1: 190. 1827. *Poa mexicana* Hornem. Hort. Hafn. 2: 953. 1815.**

Pine and scrub-oak forests, damp thickets, meadows, dry, open or brushy slopes, roadsides and waste places, 900–2,400 meters; Alta Verapaz; Izabal; Jalapa; Jutiapa; Santa Rosa; Escuintla;

Guatemala; Sacatepéquez; Chimaltenango; Sololá; Huehuetenango; Quezaltenango. Texas to California; Mexico; Honduras; El Salvador; Costa Rica; Venezuela; Brazil.

Culms erect or geniculate at the lower nodes, 20–45 cm. high, glabrous; sheaths glabrous with a conspicuous tuft of hairs at the throat; blades mostly 5–10 cm. long, 2–3 mm. wide, flat, attenuate; panicles oblong or pyramidal, 5–15 cm. long, loosely flowered, the branches ascending or spreading, the branchlets and pedicels divergent; spikelets oblong, usually purple, 4–6 mm. long, 6–10-flowered; lemmas about 2 mm. long, acute or subobtusate.

Eragrostis praetermissa Harvey, Bull. Torrey Club 81: 408. 1954.

Known only from the type collection from near Santa Rosa, Baja Verapaz, *Türkheim* 1292.

Perennial; culms tufted, erect, about 70 cm. high; sheaths longer than the internodes, densely villous, especially toward the summit, the hairs on the collar conspicuous; blades 15–25 cm. long, 4–6 mm. wide, firm, scabrous, sparsely papillose-pilose on the upper surface; panicles 40 cm. long, 10–15 cm. wide, the branches stiffly ascending to spreading, the lower ones as much as 12 cm. long, the branchlets and pedicels divergent; spikelets 3–5 mm. long, 4–8-flowered, ovate to lanceolate, the florets slightly spreading; glumes acute, about 2 mm. long; lemmas ovate, acute, the lower one 2–2.2 mm. long, the lateral nerves evident but not conspicuous.

This species is credited to Mexico by L. H. Harvey, based on a specimen collected at Jacuaro, Michoacán, A. S. Hitchcock 6956. The specimen, however, is referable to *E. intermedia* Hitchc.

Eragrostis simpliciflora (Presl) Steud. Syn. Pl. Glum. 1: 278. 1854. *Megastachya simpliciflora* Presl, Rel. Haenk. 1: 283. 1830.

Moist plains, fields, and roadsides, to about 1,500 meters; Jalapa; Guatemala. Southern Mexico to Panama.

Annual; culms tufted, often dense, spreading or prostrate, 10–40 cm. long, rather freely branching at the lower nodes; blades 4–12 cm. long, 2–4 mm. wide, acuminate, pilose on the upper surface; panicles 2–10 cm. long, rather dense, usually purple-tinged, the short stiff branches ascending to spreading, spikelet bearing to the base, often so numerous on the branches that the whole plant appears to be a dense inflorescence; spikelets sessile or nearly so, narrow, 1–3 cm. long, 10–30-flowered, solitary or in groups of 2–4, appressed; lemma 5 mm. long, acuminate, gradually narrowed from the base, the lateral nerves double; palea half as long as the lemma, narrow, lunate.

Eragrostis tephrosanthos Schult. Mant. 2: 316. 1824. *E. delicatula* Trin. Mém. Acad. St. Pétersb. VI. Sci. Nat. 2: 73. 1836.

Moist fields, sand flats, roadsides, and waste places, up to 2,000 meters; Alta Verapaz; Izabal; Zacapa; Jalapa; Escuintla; Huehue-

tenango; Suchitepéquez; Retalhuleu; Quezaltenango. West Indies; Florida to Texas; Mexico to Panama; Colombia to Surinam and Brazil.

Annual; culms slender, erect or geniculate-spreading, 10–30 cm. high; blades lax, flat, acuminate, 4–15 cm. long, 2–4 mm. wide, glabrous; panicles lax, open, 5–12 cm. long, pilose in the axils, the branches spreading, naked at the base, often rather densely flowered; spikelets plumbeous, 4–6 mm. long, 1.5 mm. wide, 6–12-flowered, short-pedicellate, usually somewhat spreading, the first glume 1 mm. long, the second about 1.3 mm. long; lemmas 2 mm. long, subobtusate.

Eragrostis viscosa (Retz.) Trin. Mém. Acad. St. Pétersb. VI. Math. Phys. Nat. 1: 397. 1830. *Poa viscosa* Retz. Obs. Bot. 4: 20. 1786. *Eragrostis tenella viscosa* Stapf ex Hook. f. Fl. Brit. Ind. 7: 315. 1896.

Sandy river banks, gravelly or rocky hills and fields to about 2,000 meters; Izabal; Zacapa; Jutiapa; Santa Rosa; Escuintla; Guatemala; Retalhuleu. Mexico; El Salvador. Introduced from southeastern Asia.

Culms 10–50 cm. high, geniculate-ascending, viscid at least below the nodes; sheaths longer or shorter than the internodes, glandular toward the summit, with a few long hairs in the throat; blades 3–12 cm. long, 1–3 mm. wide, rather firm; panicles commonly 5–15 cm. long, 1–2 cm. wide, rather densely flowered, the branches stiffly ascending or spreading, viscid; spikelets 3–4 mm. long, pale or purple; lemma and palea obtuse, the keels of the palea ciliate with long hairs.

ERIOCHLOA H.B.K.

Spikelets usually in pairs, arranged in two rows on one side of a slender rachis, the back of the fruit turned away from the rachis; first glume united with the thickened first segment of the rachilla, forming a ring-like callus below the second glume; second glume and sterile lemma equal or nearly so, acute or acuminate, 3-nerved; fruit much shorter than the second glume and sterile lemma (in our species), elliptic, awnless or short-awned, minutely striate and cross-wrinkled or papillose-roughened, the margins of the lemma firm, inrolled, rather tightly enclosing the palea.

Annuals or perennials with flat blades and terminal inflorescences composed of 2 to many one-sided racemes racemose on a common axis.

About 25 species, in warm regions of both hemispheres.

Racemes 1 or 2, 1–2 cm. long, densely villous *E. distachya*.

Racemes usually few to several, rarely only 2.

Sheaths and blades velvety pubescent. Spikelets 6 mm. long, the pedicels with long dense stiff hairs *E. nelsoni*.

Sheaths and blades not velvety, usually glabrous or scabrous.

- Spikelets 6–7 mm. long, the second glume long-acuminate, sometimes aristate; racemes few. *E. aristata*.
 Spikelets 4 mm. long, the second glume acuminate, never aristate; racemes usually numerous. *E. punctata*.

Eriochloa aristata Vasey, Bull. Torrey Club 13: 229. 1886.

Margin of waterholes and moist salt flats at low altitudes; Zacapa; Jutiapa. Mexico.

Annual; culms erect or ascending, 20–30 cm. high, branching at the lower nodes; sheaths mostly longer than the internodes, glabrous; blades 3–7 cm. long, 2–5 mm. wide, acuminate, glabrous; panicles long-exserted, 4–4.5 cm. long, the axis densely scabrous; racemes 1–1.5 cm. long, appressed; spikelets 6–7 mm. long including the awns; second glume acuminate or aristate, densely villous in the lower half; sterile lemma similar to the second glume but shorter; fruit 2.5 mm. long, striate, minutely pubescent at the summit, bearing a scabrous awn about 1 mm. long.

The description applies only to the Guatemala specimens, which are not typical. More adequate material may prove that they are a new species.

Eriochloa distachya H.B.K. Nov. Gen. & Sp. 1: 95. *pl.* 30. 1815.

Hills between Cajval and Cahabón, 400 meters, Dept. Alta Verapaz. Costa Rica; Panama; Venezuela and Colombia to Bolivia, Paraguay and Brazil.

Low, freely branching perennial; culms 10–40 cm. high, slender, erect or geniculate-ascending, densely pubescent below the inflorescence, the nodes bearded, otherwise glabrous; sheaths glabrous or sparsely pilose, with a small tuft of hairs in the throat; ligule densely ciliate, less than 0.5 mm. long; blades 3–15 cm. long, 2–5 mm. wide, flat, acuminate, erect, glabrous, or sparsely pilose on the upper surface, the margins finely scabrous; inflorescence long-exserted, composed of 1 or 2 divergent, distant, short racemes; racemes 1–2 cm. long, straight or somewhat curved, densely villous; spikelets 3 mm. long, pectinate, the pedicels with long hairs at the summit; second glume and sterile lemma bluntly acute, densely villous with appressed hairs; fruit 2.4 mm. long, oblong, blunt, pale, awnless, with a few long hairs at the tip.

Eriochloa nelsoni Scribn. & Smith, U. S. Dept. Agr. Div. Agrost. Bull. 4: 12. 1897.

Damp thickets and grassy slopes, 420–850 meters; Jutiapa; Chiquimula. Southern Mexico; Nicaragua.

Annual; culms erect or usually decumbent-spreading, branching, as much as 1 meter long, densely pilose, especially below the inflorescence; sheaths shorter than the internodes, velvety pubescent; blades 6–20 cm. long, 8–14 mm. wide, or those of the branches smaller, acuminate, velvety pubescent; racemes 2–several,

ascending to spreading, the rachis densely pilose, the pedicels of the spikelets densely hairy, the hairs stiff, reaching to more than half the length of the spikelet; spikelets 6–8 mm. long, usually spreading; second glume and sterile lemma subequal, acute, densely pilose to above the middle, the upper part glabrous; fruit 4 mm. long, blunt, awnless, minutely striate.

Eriochloa punctata (L.) Desv. ex Hamilt. Prodr. Pl. Ind. Occ. 5. 1825. *Milium punctatum* L. Syst. Nat. ed. 10. 2: 872. 1759. *Agrostis punctata* Lam. Encycl. 1: 58. 1783. *Oedipachne punctata* Link, Hort. Berol. 1: 51. 1827. *Helopus punctatus* Nees, Agrost. Bras. 16. 1829. *Monachne punctata* Nash, Bull. Torrey Club 30: 374. 1903.

Brushy slopes, open banks, and cultivated ground, near sea level; Izabal. West Indies; southeastern United States; Mexico to Argentina.

Glabrous, rather freely branching perennial; culms erect or ascending from a decumbent base, commonly more than 1 meter high, densely pilose below the inflorescence; sheaths rounded, usually much shorter than the internodes, the prophylla in those subtending the branches often elongate and conspicuous; ligule densely ciliate, about 0.5 mm. long; blades 15–40 cm. long, 5–15 mm. wide, acuminate, the margins finely scabrous; inflorescence 10–20 cm. long, the axis and the rachis of the narrowly ascending racemes densely pubescent and also pilose; racemes many, ascending or appressed, the lower one 4–5 cm. long; spikelets 4 mm. long; second glume and sterile lemma equal, acuminate, densely pilose on the lower part with appressed white hairs, the upper portion glabrous; fruit about 2 mm. long, the hispidulous awn about 1 mm. long.

ERIOCHRYSIS Beauv.

Spikelets in pairs, the sessile spikelets perfect, the pedicellate somewhat smaller, pistillate, the rachis finally disarticulating below the spikelets; glumes equal, indurate, densely covered on the margins and on the back toward the summit with golden brown silky hairs; fertile lemma awnless.

Tufted perennial grasses with short racemes arranged in a very dense, lobed, brown, silky inflorescence.

Species 9, four in America, four in Africa, and one in India.

Eriochrysis cayennensis Beauv. Ess. Agrost. 8. *pl.* 4, *f.* 11. 1812. Figure 39.

Wet fields, ditches, and marshy places, up to 1,350 meters; Petén; Alta Verapaz; Izabal; Santa Rosa. British Honduras; southern Mexico; Honduras; Costa Rica; Panama; West Indies; Colombia to Surinam, Bolivia, northern Argentina, and Brazil.

Coarse, densely tufted perennial; culms erect, commonly 1.5–2 meters high, the nodes densely bearded, otherwise glabrous; sheaths densely and softly villous,



FIG. 39. *Eriochrysis cayennensis*, $\times \frac{1}{2}$.

especially toward the summit, less so below, elongate, overlapping, or sometimes, especially the upper bladeless sheaths, shorter than the internodes; ligule 12 mm. long, thin, white, truncate; blades villous like the sheaths, 15–40 cm. long, 5–12 mm. wide, flat or folded, firm; panicles golden brown, very dense and spike-like, interrupted below, 8–20 cm. long, 2–3 cm. wide, the branches short, appressed, densely villous in the axils with long hairs; spikelets 2.5–3 mm. long, the first glume glabrous on the back, the tip and margins fringed with brown silky hairs.

EUCHLAENA Schrad.

Spikelets unisexual, the staminate in terminal panicles of racemes, the pistillate in spikes infolded in foliaceous spathes or husks, 2–several enclosed together in the leaf sheaths; staminate spikelets 2-flowered, in pairs on one side of a continuous rachis, one nearly sessile, the other pedicellate; glumes membranaceous, acute; lemma and palea hyaline; pistillate spikelets solitary on opposite sides of the rachis, sunken in cavities, the indurate first glume covering the cavity; second glume membranaceous, the lemma hyaline.

Coarse annuals with broad flat blades.

Species 2, in Mexico and Central America.

Euchlaena mexicana Schrad. Ind. Sem. Hort. Goettingen 1832; Linnaea 8: Litt. 25. 1833. *Teosinte*. Figure 40.

Grassy meadows, llanos around Ipala, 900 meters, Chiquimula, *Steyermark* 30287; abundant in cornfields, region of El Tablón, 850–900 meters, Jutiapa, *Standley* 75850, 75910. Mexico. Cultivated for forage in several countries of Central and South America.

Culms usually in large clumps, erect or ascending, commonly 2–3 meters high, branching at the base; sheaths glabrous; blades flat, elongate, as much as 8 cm. wide, the upper ones reduced, glabrous on both surfaces, the margins scabrous; staminate racemes few to many, crowded; staminate spikelets about 8 mm. long, acute or acuminate; joints of the pistillate spike about 8 mm. long, readily disarticulating, bony-indurate, smooth and shining.

FESTUCA L.

Spikelets few- to several-flowered, the rachilla disarticulating above the glumes and between the florets; glumes narrow, unequal, the first 1-nerved, the second 3-nerved; lemmas rounded on the back, awnless or awned from the tip; palea not adhering to the caryopsis.

Densely tufted annuals or perennials with flat or involute blades and narrow or open panicles.

Species about 150, in cold and temperate regions of both hemispheres and in tropics at higher altitudes.

Plants annual.

Lemmas ciliate toward the summit. *F. megalura*.

- Lemmas not ciliate *F. dertonensis*.
 Plants perennial.
 Blades flat, 5–10 mm. wide.
 Lemmas awnless or nearly so *F. amplissima*.
 Lemmas awned, the awn 8–13 mm. long *F. breviglumis*.
 Blades involute, or if flat, not more than 3 mm. wide.
 Lemmas very scabrous, the nerves prominent; blades lax, those of the culm flat *F. willdinoviana*.
 Lemmas glabrous or scabrous only toward the tip, the nerves obscure; blades firm, involute.
 Blades very scabrous; spikelets 1–1.5 cm. long, 6–8-flowered . . *F. tolucensis*.
 Blades smooth or scaberulous; spikelets 5–8 mm. long, 3–4-flowered.
F. hephaestophila.

Festuca amplissima Rupr. Bull. Acad. Sci. Brux. 9, pt. 2: 236. 1842; Fourn. Mex. Pl. 2: 125. 1886.

Open woods, 2,000–3,000 meters; Sacatepéquez; Huehuetenango; Quezaltenango. Mexico; Costa Rica; Panama.

Coarse perennial; culms erect, as much as 2 meters high, scabrous or nearly smooth; sheaths scabrous, shorter than the internodes, the lowermost becoming fibrous with age; blades 15–75 cm. long, 5–10 mm. wide, flat, firm, scabrous, acuminate or attenuate to a fine involute tip; ligule very short; panicles 20–30 cm. long, open, the branches slender, more or less flexuous, ascending or spreading, naked at the base, the lower ones usually about 15 cm. long, sometimes as much as 25 cm. long; spikelets 8–15 mm. long, 4–7-flowered; glumes acute or acuminate, the first 4–6 mm. long, 1–3-nerved, the second 5–7 mm. long, 3-nerved; lemmas 7–8 mm. long, acute or acuminate, smooth or somewhat scabrous toward the tip, awnless or mucronate.

Festuca breviglumis Swallen, Contr. U. S. Nat. Herb. 29: 398. 1950. Figure 41.

Damp forests, region of Los Positos, Dept. Chimaltenango, 2,250–2,400 meters, *Standley* 80130. Costa Rica, the type from El Copey, Province of San José, *Standley* 41998.

Perennial; culms erect, 55 cm. tall; sheaths glabrous, the lowermost becoming fibrous with age; ligule a very short membrane less than 0.1 mm. long; blades flat, attenuate, 5–8 mm. wide, scabrous on the margins, otherwise glabrous; panicles 21 cm. long, lax, drooping, the branches somewhat flexuous, paired, the pairs distant; spikelets mostly 4-flowered, 2 cm. long, excluding the awns; glumes

FIG. 40. *Euchlaena mexicana*. Plant, much reduced; pistillate inflorescence enclosed in bract (a) and with portion of bract removed (b), $\times 1$; lateral view of rachis joint and fertile spikelet (c), and dorsal view of same, showing first glume (d), $\times 2$.



acute or subacuminate, the first 3–5 mm. long, 1-nerved, the second 4–9 mm. long, 3-nerved; lowest lemma 14–17 mm. long, attenuate, scabrous, the awn 8–13 mm. long; palea about 1 cm. long, finely scabrous; rachilla appressed-hirsute.

Festuca dertonensis (All.) Aschers. & Graebn. Syn. Mitteleur. Fl. 2: 558. 1901. *Bromus dertonensis* All. Fl. Pedem. 2: 249. 1785.

Open banks, dry slopes, and moist meadows, about 2,400–4,000 meters; Chimaltenango; Quezaltenango; San Marcos. British Columbia to Baja California; Ecuador to Chile, Brazil, and Argentina. Introduced from Europe. Figure 42.

Annual; similar in habit and aspect to *F. megalura*; panicles usually shorter and more open, the branches sometimes spreading; first glume about 4 mm. long, the second 6–7 mm. long; lemmas 7–8 mm. long, scabrous toward the summit, the margins not ciliate; awn about 1 cm. long.

Festuca hephaestophila Nees ex Steud. Syn. Pl. Glum. 1: 310. 1854. *F. tolucensis* var. *hephaestophila* Nees ex Hook. Jour. Bot. Kew Misc. 2: 105. 1850.

Summit of Sierra de los Cuchumatanes,* between Tojquiá and Caxín bluff, Dept. Huehuetenango, 3,700 meters, *Steyermark* 50156, 50177. Southern Mexico.

Perennial; culms in dense tufts, erect, 10–50 cm. high, rarely higher; leaves glabrous or scaberulous, the blades firm, involute, curved, as much as 20 cm. long, but usually less; panicles 4–10 cm. long, narrow, the few short branches appressed or sometimes spreading, few-flowered; spikelets 5–8 mm. long, 3–4-flowered; lemmas about 5 mm. long, glabrous on the back, scabrous toward the tip, the nerves obscure, the awn 1–2 mm. long.

Festuca megalura Nutt. Jour. Acad. Phila. II. 1: 188. 1848. *Vulpia megalura* Rydb. Bull. Torrey Club 36: 538. 1909.

Openings in pine and pine-oak woods, dry ridges, fields and waste places, 2,000–4,200 meters; Jalapa; Chimaltenango; Quezaltenango. Western North America from British Columbia to Baja California; Pacific slope of South America.

Annual; culms slender, erect, 20–60 cm. high; sheaths and blades soft, glabrous, the blades mostly 1–2 mm. wide; panicles 7–20 cm. long, narrow, rather dense, the branches appressed, spikelets 3–5-flowered, appressed, short pedicellate; glumes very unequal, the first 1–2 mm. long, the second 4–5 mm. long; lemmas 4–6 mm. long, scabrous, tapering into a straight awn 8–15 mm. long.

Festuca tolucensis H.B.K. Nov. Gen. & Sp. 1: 153. 1816.

Open places in pine forests, 4,100–4,600 meters; San Marcos. Southern Mexico; Costa Rica.

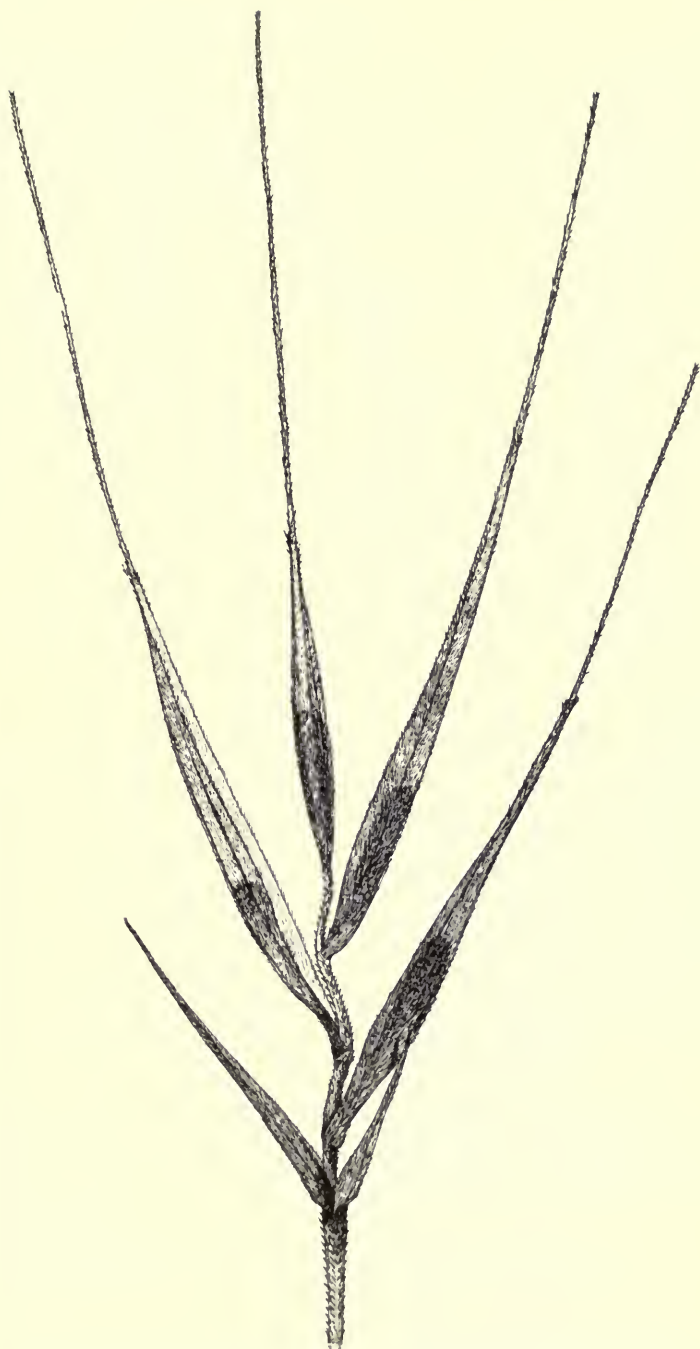


FIG. 41. *Festuca breviglumis*. Spikelet, $\times 5$.



FIG. 42. *Festuca dertonensis*. Plant, $\times \frac{1}{2}$; spikelet, $\times 5$.

Perennial; culms densely tufted, erect with numerous innovations, mostly 30–70 cm. high; sheaths scabrous; blades elongate, involute, firm, very scabrous, usually curved or flexuous; panicles 8–20 cm. long, somewhat nodding, the few branches slender, flexuous, ascending or spreading, scabrous, usually naked below the middle; spikelets 1–1.5 cm. long, 6–8-flowered, the florets somewhat spreading; lemmas 6–8 mm. long, obscurely nerved, acuminate, scabrous, sometimes with an awn about 1 mm. long.

Festuca willdinoviana Schult. Mant. 2: 650. 1827. *F. mexicana* Willd. ex Spreng. Syst. Veg. 1: 356. 1825.

Wet meadows and wooded ravines in alpine areas, 3,400–3,700 meters; Huehuetenango. Southern Mexico.

Perennial; culms slender, in small tufts, erect or ascending, 30–70 cm. high; sheaths longer than the internodes, glabrous, the lower ones becoming fibrous with age; blades flat, glabrous, or somewhat scabrous on the margins, those of the innovations mostly 5–10 cm. long, about 1 mm. wide, those of the culm 10–20 cm. long, about 2 mm., rarely 3 mm., wide; panicle 5–20 cm. long, nodding, the solitary branches flexuous, ascending to finally reflexed, naked toward the base; spikelets about 1 cm. long, 2–4-flowered, short pedicellate; lemmas 6–8 mm. long, scabrous, the nerves rather prominent, acuminate, usually with an awn 1–3 mm. long.

GIGANTOCHLOA Kurz

Caespitose bamboos with promptly determinate, thick rhizomes; culms erect or suberect, the tip nodding or broadly arched, sometimes pendulous, even flagellate, the branches (in some species suppressed at the lower nodes of the culm) unarmed, fasciculate, strongly unequal, the central one at each node strongly dominant and flanked by several pairs of progressively shorter and more slender ones; the culm sheaths usually deciduous; leaf blades usually without typical tessellate venation, but often with pellucid dots between the tertiary veins. Inflorescences usually capitate, with pseudospikelets congested in dense, more or less spherical aggregates at the nodes of leafy or more commonly leafless branches; spikelets few-flowered, the rachilla short, usually not disarticulating except below the first lemma; lodicules 3 or less, sometimes none; stamens 6, filaments more or less completely monadelphous, sometimes only partially so; style usually elongate, stigmas 1–3, hirsute. Fruit a usually sulcate caryopsis with a thin pericarp.

About 30 species have been described, all relatively large, tropical bamboos, mostly from southeastern Asia and adjacent islands. Many are locally important as sources of materials for building and for making articles of daily use.

Three species have been introduced in Guatemala.

FIELD KEY

Culm sheaths promptly deciduous; culm nodes bearing a ring of root primordia for a considerable distance up the culm.

Surface of culm internodes papillose; culm nodes more or less strongly inflated, the culms conspicuously flared downward (larger) at the base. . . *G. aspera*.

Surface of culm internodes bearing hair-impressions, not papillose, the nodes not appreciably inflated, the culms not conspicuously larger at the base.

G. verticillata.

Culm sheaths tardily deciduous or persistent, culm nodes not bearing root primordia except at the very base of the culm. *G. apus*.

Gigantochloa apus (Schult.) Kurz, Ind. Forester 1: 344. 1876.
Bambusa apus Schult. f., Syst. 7: 1353. 1830.

Heyne (De nuttige planten van Indonesie, 1: 297. ed. 3. 1950) indicates this as the most useful of the bamboos in Java. He continues (op. cit. p. 299):

"Because of their strength and durability [the culms] are best liked for building houses and bridges, and for all kinds of woven work. In each roof, item of basketry, and each tie where strength is required, this species is used. It is the only bamboo [available in Java] from which strong lashings can be made. It is also the only species of bamboo of which the culms are used for the framework of rattan furniture."

Kurz (Ind. For. 1: 345. 1876) says: "While young [this bamboo] is usually called *bamboo talie* [string-bamboo] because in this state it is chiefly used for strings, ropes, etc.; full-grown it generally goes under the name of *bamboo apoos*."

This bamboo was successfully introduced into the United States from Surinam by Dr. David Fairchild on behalf of the United States Department of Agriculture in about 1932, and it was later established in cultivation at the Federal Experiment Station at Mayagüez, Puerto Rico. From there plants were secured for introduction in Guatemala by the Instituto Agropecuario Nacional. These are being propagated and tested at Chicolá, Suchitepéquez, and Alta Verapaz. Java (whence the type).

A medium-sized caespitose bamboo, with determinate rhizomes, and erect or suberect culms to 20 meters in height and 9 cm. in diameter, arched above, with wood up to 13 mm. thick at the base; internodes up to 65 cm. long, cylindrical or slightly sulcate above the insertion of the branches, covered with fine, appressed, white or dark, rather persistent hairs, the nodes not at all or only slightly inflated, often fringed on the edge of the sheath scar with shaggy brown hairs, all gemmiferous. Culm sheaths rather tardily deciduous, rather soft and soon disintegrating, broad, oblong, broadly convex at the top, appressed pubescent with dark, fugacious, stiff, appressed hairs; auricles small, somewhat elongated and excurrent, with or without marginal setae, fragile, soon lost; ligule 3-5 mm. high, arcuate, irregularly dentate, the margin erose or ciliolate; sheath blade ovate-triangular to lanceolate, appressed at first and soon partially reflexed and curved upward,

falling off when dry, at first appressed pubescent on both surfaces with coarse dark deciduous hairs, and on the upper surface often clothed also with fine white persistent hairs. Branches (usually suppressed in the lower part of large culms) coarse, the nodes of the principal one at each node fringed with shaggy brown hairs, otherwise glabrous and usually more or less strongly pruinose. Leaf sheaths strongly pruinose, strongly keeled above, and often salient-veined, ciliate along the margins and at first appressed pubescent, later glabrescent, the petiole collar flaring, emarginate, ciliolate or erose on the margin; auricles when present small, with inconspicuous glabrous marginal setae; ligule 2–4.5 mm. long, ciliolate on the margin, glabrous or nearly so on the back; petiole 4–15 mm. long, glabrous; leaf blade 9–40 cm. \times 12–65 mm., ovate-lanceolate or oblong-lanceolate, acuminate above, asymmetrically rounded at the base, glabrous on the upper surface, lighter in color and at first appressed pubescent, later glabrescent on the lower surface, the midrib and secondary veins paler and salient below, the tertiary veins not tessellated but often connected by numerous ripple-like transverse ridges.

Gigantochloa aspera (Schult.) Kurz, Ind. Forester 1: 221. 1876.

Bambusa aspera Schult. f. 7: 1352. 1830. *Dendrocalamus asper* (Schult.) Backer in Heyne, Nut. Pl. Ned. Ind. (ed. 2) 1: 301 1927.

Of this bamboo, Kurz (op. cit. pp. 340–341) says “it produces the strongest culms, and is, therefore, extensively cultivated all over the Indian Archipelago as far north as Malacca, . . . and is generally known under the Malayan name of *bamboo bitoong*. Along the base of the Java hills, at 2,000 to 4,000 feet [615–1230 m.] elevation, it forms extensive forests . . . [of culms] 100 to 120 feet in height.” Elsewhere (op. cit. p. 221) Kurz lists this species first among those that appeared to him to yield more durable culms, adding that these are used by preference for the principal post and scaffolding for houses in Java, because of their great strength and durability.

This bamboo was introduced into the United States through the agency of the United States Department of Agriculture, from which source the Instituto Agropecuario Nacional secured plants for trial in Guatemala. Suchitepéquez; Alta Verapaz. Amboina (whence the type); Indian Archipelago.

Very large, caespitose bamboo, with enormous, determinate rhizomes, and culms reaching 30 meters in height and 20 cm. in diameter, erect or apically arched; the lower internodes relatively short, with thick walls, those in the middle of the culm up to 55 cm. long, all densely clothed at first with gray-brown acicular hairs, beneath which they are papillose-asperous; nodes all gemmiferous, those in the lower part of the culm rather strongly inflated, ringed with a wide band of root primordia. Culm sheaths promptly deciduous, thick, stiff, dorsally convex when dry, broad, oblong, broadly convex at the top, appressed-pubescent, glabrescent on the back; auricles small, rounded, with a few delicate setae on their margins, fragile, soon lost; ligule 6–10 mm. high, coarsely dentate and ciliate on the margin; sheath blade much narrower at the base than the apex of the sheath, ovate to lanceolate, more or less strongly reflexed, almost as long as the sheath

in the middle of the culm, more or less hispid or appressed-pubescent on both surfaces, gradually glabrescent, especially on the outer surface. Branches more or less completely suppressed in the lower part of large culms, or commonly with a few slender subsidiary branches developing at the lower nodes. Leaf sheaths coarse, keeled above, salient-veined, dorsally glabrous or in part hispidulous, usually without auricles and oral setae; petiole collar flaring, usually ciliate along the margin at first; ligule as wide as the apex of the sheath, 0.5–2.5 mm. high, erose or ciliate on the margin; petiole long, glabrous or scabrous on one or both surfaces; leaf blades 14–15 cm. \times 23–85 mm., lanceolate, acuminate and apiculate at the tip, more or less asymmetrically rounded or cuneate at the base, scabrous or sparsely hispidulous on the upper surface, paler in color and villous to hirsute on the lower surface, especially in the lower part of the culm, often more or less completely glabrous in the upper part of the culm, midrib and secondary veins salient on the lower surface, without conspicuous transverse veins, but with ripple-like ridges between the tertiary veins.

Gigantochloa verticillata (Willd.) Munro, Trans. Linn. Soc. 26: 124. 1868. *Bambusa verticillata* Willd Sp. Pl. 2: 245. 1799. Figure 43.

According to J. J. Ochse (Vegetables of the Dutch East Indies, p. 325. 1931) this is one of the largest bamboos of Java and, after *awi tali* (*G. apus*), the most useful. Numerous forms of it are cultivated under distinctive native names in Java, some for their edible shoots (e.g. *andong* and *awi Leah*) and others for their strong culms (e.g. *gambong*), which are used for posts and, in a flattened condition, as a covering for floors and partitions (Ochse, op. cit. pp. 326–327). A large, timber-type form was introduced from Sumatra into the Western Hemisphere in 1926 by the United States Department of Agriculture under P.I. No. 79568. Plants from this introduction, brought into Guatemala by the Instituto Agropecuario Nacional, were established at Chocóla, whence propagating material has been distributed for trial in various parts of the country. Suchitpéquez; Alta Verapaz. Java (whence the type); Sumatra.

A large caespitose bamboo growing in compact clumps, the culms to 25 meters tall (80–100 ft., teste Munro) and 10 cm. in diameter, erect, straight except at the more or less nodding or pendulous tip; internodes moderately elongate (V:50 \times 10 cm. with wood 1.5 cm. thick), cylindrical, more or less densely strewn, in the upper half, with antrorse-appressed brown needle-like deciduous hairs which leave their imprint on the surface when they fall away; nodes not or scarcely inflated, marked at first by a brown to buff zone of densely crowded, appressed hairs that make a woolly mass when scraped off, the zone gradually glabrescent in age; nodes 1–2 usually gemmiferous, the next 10–12 or more (in culms of mature-sized plants) without buds, the lower 2–4 or 5 commonly (sometimes to 20 or more) ringed with 1–several rows of root primordia, the sheath scar thick, perceptibly flared, fringed with brown hairs; culm sheaths early deciduous throughout the culm, rather hard and brittle in texture, lightly to densely strewn on



FIG. 43. *Gigantochloa verticillata* Munro. 1, leafy branch, $\times \frac{1}{2}$; 2, flower branch, $\times \frac{1}{2}$; 3, top of culm-sheath, much reduced; 4, part of young shoot, reduced; 5 and 6, spikelet, $\times \frac{1}{2}$; 7, flowering glume, enlarged; 8, palea, enlarged; 9, staminal tube and anthers, enlarged; 10, lodicules and anthers, enlarged; 11, ovary, style and stigmas, enlarged; 12, leaf-sheath, enlarged. From J. S. Gamble, *Bambuseae of British India*, Calcutta Botanic Garden, *Annals* 7: pl. 52. 1907.

the back with brown, appressed, deciduous, needle-like hairs at first, then gradually glabrescent; auricles rather well developed, unequal, scalloped on the margin, glabrous, without marginal setae; ligule short (to 3 or 4 mm. long), the apex truncate or undulate or subarcuate, the margin dentate to sub-laciniate; sheath blade lanceolate to linear-lanceolate or narrowly triangular, more or less strongly reflexed, partially to completely abscissile at the base. Branches usually partially suppressed at the base of the culm (only the small, secondary ones developing as a rule) and often completely suppressed in the middle of the culm, the complement when fully developed consisting of one strong central one flanked by several pairs of much smaller ones. Leaf sheaths numerous, ribbed-striate, densely pubescent, the inner ligule weakly developed, asymmetrically truncate to convex, the outer one emarginate, pubescent on the back, irregularly setose on the margin, auricles and oral setae obsolete; petiole rather short, glabrous or nearly so, the leaf blade lanceolate to linear-lanceolate, attenuate above, rounded to attenuate at the base, pubescent and paler (somewhat glaucous) on the lower surface, otherwise glabrous or nearly so, midrib and secondary veins inconspicuous on the upper surface, salient below; the tertiary ones connected on the lower surface by distant, irregularly spaced, more or less oblique transverse veinlets.

GLYCERIA R. Br.

Spikelets several-flowered, the rachilla disarticulating above the glumes and between the florets; glumes short, obtuse, scarios, 1-nerved; lemmas broad, obtuse, prominently 7-nerved, the nerves parallel.

Soft perennials with flat blades and open panicles.

Species about 35, in temperate regions of both hemispheres.

***Glyceria striata* var. *mexicana* Kelso, Rhodora 37: 263. 1935.**

Swamp along creek below Nucá, between Nucá and Quetzal, Sierra de los Cuchumatanes, Dept. Huehuetenango, 2,500 meters, *Steyermark* 49778. Mexico, infrequent.

Perennial; culms relatively slender, erect or ascending, 50–75 cm. high; sheaths longer than the internodes, glabrous; blades smooth, flat, 10–15 cm. long, 3–4 mm. wide, suberect; panicles 15–25 cm. long, narrow, lax, the branches rather narrowly ascending, somewhat flexuous; spikelets 4–5 mm. long, 4–5-flowered; first glume 1.5 mm. long, acute, the second 2 mm. long, usually obtuse; lower lemmas 2.5–2.8 mm. long, obtuse or subobtuse, purplish.

The above description applies only to the Guatemala specimens. The variety is little known and possibly may be a distinct species.

GOUINIA Fourn.

Spikelets 2–several-flowered, the rachilla articulated above the glumes and between the florets, the upper one reduced to a sterile awned rudiment; glumes subequal, 1–several-nerved, shorter than the spikelet; lemma lanceolate, 3-nerved (rarely 5-nerved), long-awned, densely ciliate below on both sides of the midnerve



FIG. 44. *Gouinia guatemalensis*. Inflorescence, $\times 1$; spikelet, $\times 5$.

and ciliate or pilose on the margins for about half the length; palea two-keeled, toothed, the teeth sometimes aristate, the margins glabrous or pubescent.

Perennial grasses with simple or branching culms and terminal panicles of slender, one-sided, simple or rarely compound spikes.

Species 13, in Mexico, Central and South America, and the West Indies.

Gouinia guatemalensis (Hack.) Swallen, Pub. Carnegie Inst. Wash. 436: 334. 1934. *Diplachne guatemalensis* Hack. Oesterr. Bot. Zeitschr. 52: 275. 1902. Figure 44.

Grassy shrubby slopes, Cerro Tixixí, north of Jocotán, Dept. Chiquimula, about 1,000 meters, *Steiermark* 31548. Described from Guatemala but without definite locality, *Friedrichsthal* 1748, type. Mexico (Yucatan); Honduras.

Perennial; culms erect, 1–3 meters high; sheaths overlapping, scabrous, papillose or papillose-pilose above; blades flat, 20–25 cm. long, 1.5 cm. wide, scabrous and sparsely pilose on both surfaces, papillose-pilose above near the base; ligule membranaceous, erose, less than 1 mm. long; panicle as much as 20 cm. long, the branches about 10 cm. long, naked below; spikelets 8–10 mm. long excluding the awns; glumes obtuse or subacute, mucronulate, scabrous, especially on the keel and toward the summit, the first 4–5 mm., the second 5–6 mm., long; lemma 7–8 mm. long, 3-nerved, bidentate, the awn about as long as the lemma; palea equal to the lemma, the margins glabrous.

GUADUA Kunth

Small to very large, caespitose or rarely dumetose bamboos with promptly or rarely tardily determinate rhizomes; culms erect or suberect or ascending, rarely climbing; the branches (sometimes suppressed except at the very base in the lower part of large culms) always several at each node above, sometimes solitary or paired in the lower middle part of the culm, the principal branch at each node flanked by one or more pairs of successively shorter and more slender subsidiary ones, the basal ones usually solitary and very thorny. Culm sheaths commonly persistent, at least in the lower part of the culm; leaf blades usually without typically tessellate venation, but often with visible ridges between the tertiary veins. Inflorescences consisting of pseudospikelets arising at the nodes of branches of various orders, rarely on specialized axes terminating leafy or leafless twigs, sometimes remaining solitary or nearly so, but typically developing more or less congested aggregates of similar flowering axes by the successive development of basal buds; spikelets terminating pseudospikelets few- to several-flowered, persistent or, more commonly, falling off sooner or later by abscission above the gemmiparous bracts; gemmiparous bracts below the flowering glumes usually several, preceded by a small, two-keeled, sometimes gemmiparous prophyll; empty glumes 0–2; rachilla segments usually abscissile and sooner or later disarticulating below each fertile lemma; palea bicarinate, with more or less obviously “winged” keels; lodicules usually 3 (2 sometimes connate); stamens 6 (occasionally 3, as in *G. spinosa*), the filaments filiform, free; ovary oblong or

ovate, crowned by the usually thickened and expanded, rigid base of the style; stigmas usually 3 or 2, plumose or pilose or rarely without appendages. Fruit a caryopsis, crowned by the persistent base of the style.

About 30 species have been described in this genus, all of them native to tropical parts of Central and South America except one, *G. philippinensis*. Three species have been found native in Guatemala, of which only one, *G. aculeata*, is of noticeable importance in the local economy. Two additional kinds have been introduced from Ecuador.

Native bamboos.

Flowering material available.

Twigs flexuous, very unequal, spreading; leaf blades broad, up to 30 mm. wide; fertile lemmas up to 30 mm. long, apiculate.....*G. aculeata*.

Twigs stiff, subequal, fasciculate; leaf blades very narrow, rarely exceeding 10 mm. in width.

Pseudospikelets up to about 2.5 cm. long; fertile lemmas 6-7 mm. long, usually tinted with wine; stamens 6.....*G. paniculata*.

Pseudospikelets up to 13 cm. long; fertile lemmas up to 21 mm. long, not tinted with wine; stamens 3.....*G. spinosa*.

Flowering material not available (field key).

Clumps compact; rhizome short-necked, promptly determinate; culms weak, thin-walled; culm sheath blade abscissile.....*G. paniculata*.

Clumps more or less open; rhizomes long-necked, somewhat tardily determinate; culms sturdy, thick-walled; culm sheath blade not abscissile.

Culms large, commonly exceeding 15 meters tall and 10 cm. in diameter; culm sheaths coarse, heavily pubescent on the back with coarse, dark, spreading hairs; junction of sheath blade and sheath proper straight or somewhat concave, symmetrical.....*G. aculeata*.

Culms usually much less than 15 meters tall and rarely exceeding 5 cm. in diameter; culm sheaths fragile, weakly pubescent on the back with soft, pale, reclining, inconspicuous hairs; junction of sheath blade and sheath proper broadly convex and very asymmetrical.....*G. spinosa*.

Introduced bamboos (field key).

Culms commonly reaching 25 meters in height and 12 cm. in diameter, mid-culm primary and secondary branches not rooting spontaneously at the base; normal leaves narrowly lanceolate....*G. angustifolia* ("caña brava").

Culms commonly reaching 15 meters in height and 8 cm. in diameter, mid-culm primary and secondary branches often rooting spontaneously; normal leaves oblong-lanceolate.....*G. angustifolia* ("caña mansa").

Guadua aculeata Rupr. ex Fourn. Mex. Pl. 2: 130. 1886.
Figure 45.

A large, thorny, native bamboo with rather open clump habit, flourishing best in rich, moist lowlands; commonly known as *tarro*

in Guatemala and elsewhere within its range. This species is closely related to *Guadua angustifolia*, and is not easily distinguished from the latter on the basis of sterile herbarium material. The zone of transition between the two species apparently occurs in Panama, *Guadua angustifolia* occurring to the south and *G. aculeata* to the north. *G. aculeata* is the most important native bamboo in the range of its occurrence, being much used for building construction and other farm needs. It apparently is slow to recover from heavy cutting, for which reason it has become virtually extinct in much of its natural range, wherever there is a fair density of population. Izabal; Sololá; Suchitepéquez; Quezaltenango. Panama to Mexico (whence the type).

Clumps open; rhizomes very heavy, somewhat tardily determinate, with a long neck (0.5 to 1 meter long in large plants); culms commonly 10–15 meters, rarely 20 meters, in height and 10–15 cm. in diameter, erect or ascending, broadly arched above; internodes hollow, usually perceptibly sulcate for a short distance above the point of attachment of the branch complement at each node, rather densely clothed with appressed, later spreading, sharp, amber-colored hairs, the surface aciculate, gradually glabrescent (V: up to 26.5 cm. long and 13 cm. in diameter; XL: to 50 cm. long and 6.2 cm. in diameter), the wood (int. V) up to 2 cm. thick; nodes more or less inflated, usually all gemmiferous, the lower ones each marked by a dense band of appressed, cream- or buff-colored hairs extending about 10 mm. below and 15 mm. above the sheath scar, these hairs gradually weathering off; culm sheaths deciduous in the upper part of the culm, usually more or less persistent at the lower nodes, more or less densely strewn on the back with long, stiff, coarse, sharp, antrorse-spreading, easily detachable hairs, usually glabrous on the margins; auricles and oral setae usually lacking entirely in the lower sheaths, sometimes somewhat developed in the upper ones; ligule short, straight or convex at the apex, typically about as wide as the apex of the sheath proper, usually ciliolate on the margin; culm sheath blade roughly triangular, about as broad at the base as the apex of the sheath proper, persistent, appressed to the culm, densely strigose on the inner surface with fine, brown hairs in narrow vertical bands separated by glabrous bands of similar width, the strigose bands more or less thickly strewn with coarse, brown, spreading, more or less persistent hairs, asperous or sparsely hispid on the outer surface, usually glabrous or nearly so on the margins. Branches developed at all culm nodes or sometimes suppressed at a few mid-culm nodes in large culms, 1 + 1 or 1 + 2 at mid-culm nodes, with one or two to several supplemental branches developing later from the basal nodes of the earlier ones, twigs abscissing ultimately. Leaf sheaths weakly compressed-keeled, more or less striate with salient nerves toward the apex, glabrous throughout or weakly ciliolate on the margins; auricles and oral setae very weak and rudimentary when present, usually lacking entirely; petiole collar slightly flaring, glabrous, undulate, sometimes emarginate at the apex, glabrous or nearly so on the margin; ligule very short, scarcely exserted; petioles up to about 5 mm. long, flat, glabrous and often nerve-striate on both surfaces; leaf blades up to 19 cm. × 28 mm. and 15 cm. × 30 mm., oblong-lanceolate to linear-lanceolate, acute and subulate above, rounded or more commonly cuneate at the base, usually



FIG. 45. *Guadua aculeata* Rupr. ex Fournier. Leafy branch and culm sheaths from de 10 (right) and mid-culm node, $\times \frac{1}{2}$. Based on McClure 21213. Drawn by McClure.

sparsely strewn with coarse, white bristles on the lower surface, more rarely and more sparsely so on the upper surface, sometimes glabrous or nearly so on both surfaces, the midrib pale and salient, and the secondary veins weakly salient on the lower surface, the latter scarcely distinguishable from the tertiary veins on the upper surface; visible transverse ridges usually lacking.

Inflorescences terminal or lateral to leafless twigs; primary lateral pseudospikelets (each subtended by a small sheath), sometimes solitary, more commonly with one or more additional ones in different stages of development as new ones arise successively from the axils of gemmiparous bracts at the lower nodes of the axis, the axis of pseudospikelets short, 2–4 mm. long, in the lateral ones bearing basally a prophyllum, followed by 1–3 gemmiparous bracts, and terminating in a single spikelet (terminal pseudospikelets often resemble conventional spikelets); prophylls 1–5 mm. long, broadly to narrowly triangular, bluntly acute, 2-keeled; gemmiparous bracts 2–3 mm. long, ovate, obtuse, apiculate or mucronate; spikelets slender, subfusiform, very slightly flattened, up to about 4.5 cm. long, and up to 3–4 mm. wide, about 7-flowered, the uppermost 2–3 florets tabescent; rachilla segments at length disarticulating below the lemmas, mostly two-thirds or three-fourths as long as the adjacent palea, clavate, curved, somewhat compressed, scaberulous above, ciliolate on the margin of the cupulate apex; empty glumes 0–1, 4–5 mm. long, ventricose, ovate, obtuse, salient-nerved, apiculate, minutely scaberulous on the back and glabrous on the margins; sterile lemmas usually 1 or 2, about 10 mm. long, somewhat ventricose, ovate-lanceolate or oblong-lanceolate, obtuse, salient-nerved, apiculate, minutely scaberulous on the back with microscopic hairs, glabrous on the margins; fertile lemmas 2–5, about 13 mm. long, like the sterile lemmas but more acute, the upper ones more acute than the lower ones, all scaberulous and more or less conspicuously farinose at first, becoming green-stramineous upon drying, glabrous and often visibly tinged with wine on the margins; palea in fully developed florets prominently exerted beyond the margin of its lemma, broadly sulcate between the broad-winged keels, ciliolate and glabrescent on the keels and scaberulous between the keels near the biapiculate apex, elsewhere glabrous; lodicules 3, up to 5 mm. long, thickish membranaceous, translucent, colorless, with many very slender veins, glabrous on both surfaces and on the margins, the anterior pair broadly lanceolate, acute, the dorsal one oblong, obtuse; exerted anthers about 6 mm. long, yellow, the produced connective minutely penicillate or glabrous; ovary triquetrous, glabrous, crowned by a short, thick, densely antrorse-hirsute style, stigmas 3, long, rather thick and soft, sparsely pubescent; mature fruit a typical caryopsis, 7–8 mm. long, straight on the front, convex and strongly sulcate on the back, crowned by the persistent style.

***Guadua angustifolia* Kunth, Syn. Pl. Aequin. 1: 253. 1822.**

Native to northeastern South America, this species is especially common in well-watered, fertile regions at elevations below 1,500 meters, particularly in Colombia and Ecuador. In Colombia it is known by the indigenous vernacular name, *guadua*, on which the generic name is based, and in Ecuador it is called *caña brava*, to distinguish it from a less thorny strain, known as *caña mansa*. The natural distribution of this bamboo extends into Panama, which

apparently is the zone of transition between it and the closely related, more northerly, *Guadua aculeata*. Like *G. aculeata*, this species is the most important native bamboo in the range of its occurrence, being much used for building construction and for farm needs. Propagating material of this species from the Summit Experiment Gardens, Canal Zone (originally from Milagro, Ecuador), was introduced into Guatemala through the agency of the Instituto Agropecuario Nacional, and is being propagated and distributed at Chocóla. Suchitepéquez; Alta Verapaz. Colombia (whence the type); Ecuador.

A large, thorny bamboo growing in open clumps; rhizomes very thick, promptly determinate; culms commonly to 20 meters, sometimes approaching 30 meters in height, commonly 10–15 cm., exceptionally 20 cm. in diameter, erect, broadly arched above; internodes hollow, usually perceptibly sulcate above the point of attachment of branch complements, the lower ones glabrous or sparsely strewn with appressed, later spreading, sharp, amber-colored hairs, the surface aciculate and gradually glabrescent, the upper ones typically more densely clothed with such hairs, aciculate and at length glabrescent, the lower internodes very short (V: 7–10 cm. long and 14.5 cm. in diameter, mid-culm internode up to 34 cm. long and 13 cm. in diameter), the wood up to 2 cm., rarely 2.5 cm., thick at the base of the culm, about 1 cm. thick in the greater part of the length in large culms; nodes with a rather prominent sheath scar, especially at the base of the culm, the lower ones marked by a dense band of appressed, cream- or buff-colored hairs extending about 10 mm. below and 15 mm. above the sheath scar, these gradually weathering off; culm sheaths deciduous in the upper part of the culm, usually more or less persistent at the lower nodes, densely and minutely tomentose on the back, especially toward the base, with small, brown, persistent hairs, and more or less densely strewn with longer, stiffer, coarser, sharp, antrorse-spreading, persistent or easily detachable hairs, and usually densely fringed on the margins with brown cilia; auricles and oral setae usually lacking entirely in the lower sheaths; ligule very variable, usually more or less strongly convex, sometimes truncate or humped, about as wide as the apex of the sheath proper, erose or dentate and ciliate on the margin; culm sheath blade roughly triangular, about as broad at the base as the apex of the sheath proper, persistent, appressed to the culm, densely strigose on the inner surface with fine, light-brown hairs in narrow, vertical bands separated by glabrous bands of similar width, glabrous or nearly so on the outer surface, usually fringed on the margins with brown cilia. Branches (in large culms, suppressed throughout the lower half or two-thirds of the height except the basal 6–10 nodes) solitary and very thorny at the basal nodes, usually 1 + 1 or 1 + 2 above the middle of the culm and progressively more fasciculate above, developing numerous supplemental branches in age, the twigs abscissing ultimately. Leaf sheaths weakly or not at all keeled, finely striate with salient veins often connected above by clearly visible transverse veinlets, glabrous throughout or weakly ciliolate on the margins; auricles usually not much developed beyond a callus at the base of the oral setae; oral setae weakly to strongly developed, few to numerous, pale, antrorse-appressed, obscurely scabrous at the base, glabrous and very attenuate above; petiole collar strongly flaring, sometimes recurved when dry, glabrous and glossy outside, undulate,

sometimes emarginate at the apex, glabrous or ciliate on the margin; ligule very short, scarcely exserted; petiole up to 1 cm. long, slender, glabrous or nearly so, often with a well-developed, dark, often puberulent pulvinus at the base; leaf blades extremely variable in size and shape, those on young growth ovate-lanceolate, up to 17 cm. \times 50 mm., ovate- to oblong-lanceolate, those on old wood up to 21 cm. \times 24 mm., oblong- to linear-lanceolate, commonly glabrous or nearly so on the lower surface, sparsely strewn with coarse white bristles or more rarely glabrous on the upper surface, sometimes glabrous on both surfaces; midrib and numerous secondary veins paler and salient on the lower surface, the latter scarcely distinguishable from the tertiary veins on the upper surface, transverse ridges often visible here and there on the lower surface.

Inflorescences borne on leafless or leafy twigs, commonly 6–7 cm. long, sometimes shorter or longer, commonly 4–5 mm. wide, linear, rather strongly flattened and tight (the florets gaping only at anthesis), solitary at first and usually more or less fasciculate at length by the development of additional ones from buds in the axils of the gemmiparous bracts, but complete ones never numerous in a given fascicle, since the spikelets usually absciss as they approach or reach maturity, rachis segments up to 3–4 mm. long, tomentose; prophylls 2–5 mm. long, narrowly to broadly triangular to ovate (sometimes subtending a bud which may form a pseudospikelet); gemmiparous bracts 1–2, ovate, obtuse, apiculate, 5–7 mm. long; spikelets curved, commonly 12–14-flowered, the apical 4–6 florets more or less tabescent; rachilla segments in the middle of the spikelet up to a little more than half as long as the adjacent palea, shorter above and below, thickish, clavate, somewhat flattened, often narrowly sulcate, not angular, glossy below, hispidulous toward the cupulate apex and ciliate on the margin of the apex; lemmas up to 13 mm. long in the middle of the spikelet, gradually reduced to about 10 mm. above and below, ovate-lanceolate, salient-nerved, apiculate, glossy and obscurely hispidulous dorsally, glabrous on the margins, the lower ones obtuse, the upper ones acute; palea strongly exserted beyond the margins of the lemma except in the uppermost 4–6 tabescent florets and sometimes not exserted in the lowest lemma, very broad, oblong, broadly obtuse at the apex, broadly sulcate and hispidulous between the broadly winged keels, minutely ciliate on the keels near the apex, glabrous and glossy between the keels and the margins; lodicules 3, unequal, ovate to oblong, rarely sublanceolate, minutely toothed on the margin at the apex, exceedingly thin, transparent, colorless, with numerous slender veins in the lower half, up to 4–5 mm. long (shorter, reddish above and ciliate on the margins in somewhat rudimentary florets); exserted anthers yellow, commonly 6–7 mm. long, the connective not produced above; ovary slender, subtriquetrous, glabrous, the style somewhat thickened basally, narrowly conical, densely antrorse-hispidulous, asymmetrically divided into 3 villous stigmas of unequal length. Mature fruit not seen.

This is a rather variable species. One of the more clearly distinct lines of variation has been given local recognition in Ecuador by the name *caña mansa*. *Caña mansa* in its more marked form is distinguishable from the species by the following field characters:

1. Weaker development of the branches and leaves at the base of the culms.
2. Fewer, shorter and blunter spines on the lower branches.

3. The generally somewhat broader, shorter leaf blades.
4. The stronger tendency of the branches to root spontaneously at the basal nodes.

This strain was introduced into Guatemala at the same time and by the same agency as the species. Suchitepéquez; Alta Verapaz. Ecuador; Colombia, whence the type.

Guadua paniculata Munro, Trans. Linn. Soc. 26: 85. 1868 (sensu lato).

A shrubby, weak-stemmed, thorny bamboo, usually of modest dimensions, apparently with a rather strongly developed tolerance of drought, thriving and often forming extensive colonies in pure stand, in a rather wide range of ecological conditions, from sea level to an elevation of 1,300 meters. The species, interpreted in a broad sense, exhibits a remarkable uniformity of habit (over-all appearance) and morphological character, throughout its geographical and ecological range, and equally remarkable variability in minor details, particularly in respect to the coloration of the floral envelope, the nature and degree of development of pubescence, and appendages such as auricles and oral setae, even in the same plant. Izabal; Jutiapa; Santa Rosa(?); Retalhuleu; Baja Verapaz. Brazil (whence the type); Venezuela; Panama; Nicaragua; El Salvador; Mexico.

Clumps fairly compact to somewhat open below, usually loose and untidy above; culms up to 8 or 9 meters tall and 7.5 cm. in diameter, weakly upright or ascending, with long, slender, broadly arched or clambering tips; internodes relatively short, the basal 1—several often solid or nearly so, the rest typically rather thin-walled, with weak, brittle wood, flattened, often coarsely ridged, and rather prominently pubescent above the point of attachment of the branch complement at each node, the surface elsewhere smooth to more or less markedly striate with fine ridges, gray-green turning yellow with age, the lower ones often densely velvety or woolly throughout with fine, deciduous or persistent hairs, sometimes glabrous or nearly so from the first, the upper ones progressively more nearly glabrous (all usually glabrous except on the sulcus in small plants); nodes with a prominent ridge above the sheath scar, bearing pubescence similar to that of the adjacent internodes, often also coarsely strigose with irregularly deciduous hairs. Culm sheaths somewhat persistent, sometimes promptly deciduous at the lower nodes, typically so at the upper ones, broadly convex at the junction of the blade, thin, stiff, brittle, fissile, the lower ones sometimes entirely glabrous on the back but more commonly more or less completely covered, especially just below the base of the blade, with fine, short, antrorse or retrorse hairs, sometimes in small plants sparsely strewn with coarse, white, appressed bristles, upper ones progressively more completely glabrous, all usually more or less conspicuously glaucous at first; auricles and oral setae generally lacking entirely, sometimes developed to a certain extent in small plants; ligule nearly obsolete, as wide as the apex of the sheath proper, 1–2 mm. high, the margin even, minutely ciliolate;

sheath blade appressed to the culm, promptly and more or less completely abscissile, thin and very fragile, broadly sublanceolate to subtriangular, abruptly narrowed at the often apiculate tip, as broad at the base as the apex of the sheath proper, entirely glabrous or more or less densely pubescent with fine buff-colored hairs at the base on the outside and becoming glabrous toward the tip, sometimes (especially in small plants) sparsely strewn throughout on the outside with appressed or spreading setae, finely striate with salient nerves and usually more densely covered on the inner surface, especially near the base, with coarser, stiffer, antrorse, buff-colored, persistent hairs, entirely glabrous or (in small plants) antrorse-setose on the margins. Branches relatively short, usually solid or nearly so, stiff, the internodes glabrous or glabrescent, the nodes prominent, the principal and subsidiary branches (of the lower primary ones) often mostly transformed into sharp thorns, the subsidiary branches of the upper ones slender, stiff, unarmed, usually branched only at the basal nodes, the internodes often puberulent or scabrous at first, then glabrescent. Leaf sheaths keeled toward the apex, not at all to prominently striate with salient veins, usually glabrous on the back and one or both margins; auricles lacking entirely or reduced to a callus at the base of the oral setae; oral setae very irregularly developed, none-few-several, up to 10 mm. long, rather stiff, flattened, tapered, smooth or nearly so to prominently scabrous, mostly antrorsely appressed; petiole collar scarcely flared, glabrous and shining on the outside, usually emarginate and arcuate at the apex, erose, or more rarely ciliolate, on the margin; ligule scarcely exserted, dorsally scabrous, undulate-truncate at the apex, ciliolate on the margin; petiole very variable, the lower ones about 2 mm., the upper ones to 5 mm., long, usually coarsely hirsute on the lower surface, more sparsely so or glabrous on the upper surface, sometimes glabrous or glabrescent on both surfaces; leaf blades up to 14.5 cm. \times 9 mm. and 13 cm. \times 12 mm., oblong-lanceolate or linear-lanceolate, attenuate, abruptly acute and often apiculate to subulate, rounded to cuneate at the base, glabrous or nearly so on both surfaces to antrorse-scabrous on both surfaces, especially toward the tip, sometimes villous on one or both surfaces, sometimes only sparsely and irregularly strewn with spreading white bristles, especially near the base on the lower surface, antrorse-setose or uncinata or serrate to subglabrous on the margins; the midrib moderately salient, the secondary nerves only slightly less so and often with a few transverse ridges faintly visible on the lower surface only, veins of the several orders scarcely distinguishable from each other on the upper surface.

Pseudospikelets borne at the nodes of leafless branches of all orders, up to about 2.5 cm. long and 3 mm. wide, definitely flattened, lanceolate, solitary at first and soon followed (upon the development of basal buds) by additional ones, the spikelet terminating each falling away in fragments, or entire, by disarticulation of the axis, usually soon after maturity; axis of pseudospikelets (the part below the spikelet) 2-3 mm. long, with hispidulous internodes; prophyllum minute; gemmiparous bracts, usually 2 or 3, sub-triangular to semi-oblong, obtuse to acute, apiculate, costate, few-veined, dorsally glabrous or nearly so, usually glabrous on the margins, persistent; empty glumes none; rachilla segments of the spikelets about one-fourth as long as the palea of the lowest functional floret to nearly one-half as long as the palea of the uppermost functional floret, soft, fragile, hollow, striate, flattened throughout, gradually and slightly thickened toward the apex, glabrous and glossy throughout, abscissing below each lemma except in the tabescent florets at the apex of the spikelet, but not always disarticulating

readily (especially the short, basal ones); sterile lemma usually one, intermediate in size between the gemmiparous bracts and the fertile lemmas and subtending a small, non-functional palea with a very short, basally and apically abscissile rachilla segment at its back; fertile lemmas usually 5 or 6, rarely 7, followed by one or two tabescent florets at the apex of the spikelet; first fertile lemma intermediate in size between the sterile lemma below and the fertile lemmas above it, with its palea more prominently exerted than that of the subsequent lemmas, the rest of the fertile lemmas about 6-7 mm. long, roughly triangular to semi-oblong, subacute, apiculate, irregularly many-nerved, scarcely costate, dorsally glabrous or nearly so, weakly ciliate or glabrous on the margins, pale greenish-stramineous, usually more or less strongly tinted with wine on one side, especially near the margin; palea usually a little longer than its lemma, thin, hyalescent, partly tinted with wine on exerted areas, puberulent above, especially between the keels, more weakly so outside the keels, broadly sulcate, the keels narrowly winged, the wings ciliate, the cilia denser and longer toward the broadly rounded apex; lodicules 3, about 1.5 mm. long, hyaline, weakly nerved below, entire or lacinate at the apex, the middle (posterior) one narrowly lanceolate, acute, the anterior two paired, sub-semi-obovate, obtuse; anthers not seen; ovary glabrous, much shrunk and about 1 mm. long in dried specimens, crowned by the broad, subconical (indented on the dorsal side), horny, brown, glabrous or nearly glabrous base of the style, the style stiff, brown, pubescent, trigonal, tapering upward and divided above into 3 long, slender, soft, glabrous or nearly glabrous, usually fugaceous stigmas; mature fruit not seen.

Guadua spinosa (Swallen) McClure, *Phytologia* 5: 82. 1954.
Arthrostyidium spinosum Swallen, *Jour. Washington Acad. Sci.*
28: 6. 1938.

Thorny, often clambering bamboo, forming massive thickets in more or less pure stands at low elevations (up to 60 meters) along rivers and in poorly drained areas. The native name in Mexico and Guatemala is recorded as "*Jimba*." Izabal; Petén. Mexico; British Honduras (whence the type).

Clump open, the rhizome branches very tardily determinate, with a long, slender, budless neck; culms up to 15 meters long and about 5 cm. in diameter (usually smaller), erect or ascending, with broadly arched or clambering tips; internodes relatively short, thick-walled; nodes not strongly inflated; culm sheaths promptly deciduous (or somewhat tardily so at the base of the culm), inconspicuously villous to weakly pilose with persistent, reclining, white hairs on the back, glabrous on the margins; auricles and oral setae lacking; ligule short, extending all the way across the broad, asymmetrically convex apex of the sheath proper, very short vertically (about 1 mm. high), very obscurely ciliate on the margin; sheath blade appressed to the culm, broadly triangular, as wide at the base as the apex of the sheath proper, abruptly narrowed to a short acuminate tip, clothed on the inner surface with long, pale, wavy, antrorsely inclined, white hairs arranged in rows between the salient veins, weakly pilose and soon glabrescent or nearly so on the outer surface, glabrous or nearly so on the margins. Branches very unequal, with usually one strong central one (sometimes with one or two of intermediate size developing from its base), surrounded with a dense

fascicle of stiff, slender, subequal, leafy twigs, these rebranched only basally, each branch complement accompanied by one or two sharp, strongly retrorse-hooked spines. Leaf sheaths strongly keeled, smooth and glossy or striate with salient nerves, villous at first and then glabrescent, or glabrous from the first, densely ciliate on the outer margin only; the petiole collar very slightly flared, glabrous and shining, humped at the apex, typically deeply emarginate, glabrous on the margin; auricles commonly obsolete, sometimes strongly developed in the upper sheaths, narrow, falcate and spreading, glabrous and sparsely to densely fringed on the margins with pale, slender, glabrous, more or less strongly radiating oral setae; oral setae (in the absence of auricles) rarely few or lacking, usually several, pale, glabrous, close-set at the base and parallel or more or less flabellately spreading above, straight or often more or less wavy or crisped; ligule minute, not exserted; petiole very short, about 2 mm. long in lower leaves and somewhat longer above, densely hispid with persistent hairs on the upper surface, glabrous or densely hispid with deciduous hairs on the lower surface; leaf blades rather stiff, up to 29 cm. \times 7 mm. and 21.5 cm. \times 10 mm., lanceolate-linear to linear, rounded to cuneate below and long-attenuate above, acuminate to subulate at the tip, obscurely scaberrulous to subglabrous on both surfaces, sometimes sparsely villous or setose especially along the midrib, and with an occasional conspicuous, strong, white bristle here and there toward the tip on the upper surface, sometimes villous along the midrib on the lower surface, cartilaginous and subglabrous to serrate to setose on one or both margins; midrib and 4-5 pairs of secondary veins salient on the lower surface, scarcely distinguishable from the tertiary veins on the upper surface, the tertiary veins very closely crowded together, with here and there an occasional oblique transverse ridge and in some leaves numerous minute papillae visible between the tertiary veins on the lower surface.

Inflorescences typically borne on special axes terminal to leafless or more commonly leafy branchlets, these usually losing their leaf blades promptly, the flowering part of the axis slender, exserted as much as 6 cm., the internodes of the flowering axis strongly flattened above the point of insertion of the pseudospikelets, the lower internodes up to 3 cm. long and more or less hispid, the upper ones progressively shorter, more slender and more glabrous to completely so, the nodes up to 5, inflated, each provided at first with a short, sheathing bract which subtends the bud from which the first pseudospikelet at each node originates; pseudospikelets up to 13 cm. long and 4 mm. wide, axis of the pseudospikelets up to about 15 mm. long, completely covered with imbricate bracts, the bracts up to about 8, the lowermost about 5 mm. the uppermost about 10 mm. long, the intermediate ones somewhat unevenly intergraded in size, all gemmiparous, oblong, abruptly acuminate, apiculate to awned, costate, many-nerved, very fragile, glabrous on the back and margins, the internodes of the pseudospikelet axis short, the lowermost somewhat puberulent apically, the others glabrous or nearly so, flattened above the insertion of the buds, not abscissile at the nodes or imperfectly so at the upper ones; spikelets lanceolate-linear, long attenuate at the base and tip, subterete, scarcely flattened, rather tight, the 5-8 functional florets spreading and gaping widely at anthesis, closing afterwards, the uppermost one tabescent; rachilla segments hollow, coarse, strongly flattened throughout, thicker at the tip, all glabrous and glossy, the lowest about 7 mm. long, the uppermost about 9 mm. long; lemmas strongly imbricate, up to 21 mm. long (excluding the 3-4 mm. long, slender, fragile, glabrous awn), the lowermost ones slightly shorter, all costate, finely striate with many close-set, slender nerves, glabrous

throughout on the back and margins, only slightly convex longitudinally, strongly inrolled on drying; paleas much shorter than their lemmas, progressively longer (up to 15 mm. long) in the higher florets, thinner in texture than the lemmas, narrowed above to a truncate apex tipped by two hispidulous awns (keel-nerves produced), scarcely or weakly winged on the keels, strongly ciliate on the keels only in the upper half, strigose between the keels near the apex, otherwise glabrous; lodicules 3, subequal, up to 6 mm. long, opaque, reddish brown and thicker at the base and longitudinally along the median line, elsewhere hyaline, more or less densely hispidulous on the outer surface, glabrous on the inner surface, minutely ciliate near the acuminate apex or glabrous throughout on the margin, the front pair sub-semi-lanceolate, the posterior one lanceolate, usually somewhat thinner than the others, more translucent and showing many slender veins with one stronger, central one; stamens 3, anthers yellow, obtuse, up to 8 mm. long, the filaments filiform, free; ovary slender, glabrous, the style slender, not thickened at the base, densely pubescent above, ending in a solitary(?) stigma. Mature fruit unknown.

GYMNOPOGON Beauv.

Spikelets 1-3-flowered, articulated above the glumes, subsessile in two rows on one side of the slender rachis, the rachilla prolonged beyond the upper floret, often bearing a very rudimentary floret, this sometimes reduced to awns; glumes narrow, acuminate, 1-nerved, nearly equal, longer than the florets; lemmas narrow, 3-nerved, awned from between the teeth of a minutely bifid apex, or sometimes almost awnless.

Perennial grasses with erect stiff culms, rounded sheaths, firm, flat or loosely rolled, stiffly spreading blades, and few to numerous slender spikes scattered along the upper half or third, or crowded at the summit of the culm.

Species about 15, warmer parts of America.

Gymnopogon spicatus (Spreng.) Kuntze, Rev. Gen. 3, pt. 3: 354. 1898. *Polypogon spicatus* Spreng. Syst. Veg. 1: 243. 1825. *Gymnopogon laevis* Nees, Agrost. Bras. 428. 1829. *G. filiformis* Griseb. Fl. Brit. W. Ind. 538. 1864. Figure 46.

Marshy prairie near Los Amates, Izabal, *Weatherwax* 97; coastal pine-flats, All Pines, Stann Creek District, British Honduras, *Schipp* 787. Mexico (Veracruz); Honduras; Trinidad; Colombia and Venezuela; Bolivia; Brazil; Uruguay; Paraguay, and northern Argentina.

Perennial; culms slender, erect, 30-100 cm. tall (usually more than 50 cm.), more or less branching; sheaths overlapping, glabrous or pilose at the throat; ligule very short, minutely ciliate; blades flat or loosely rolled, 2-4 cm. (rarely to 6 cm.) long, 3-6 mm. (rarely to 9 mm.) wide, acute, mostly stiffly spreading, glabrous, the margins scabrous; panicle very open, sprawling and tangled with age; spikes few to several, 15-25 cm. long, very slender, flexuous, spreading or drooping, rather distant, naked toward the base or with a few imperfect spikelets; spikelets 1-2-flowered, somewhat imbricate on the upper half of the spikes; glumes

acuminate, awn-pointed, 5–6 mm. long; lemma 2.5–3 mm. long, the callus sparsely pilose, the back and margins glabrous or sparsely pilose, the awn slender, scabrous, 8–12 mm. long; rudiment very small or reduced to an awn about 5 mm. long.

GYNERIUM Willd.

Dioecious; staminate spikelets 2-flowered; glumes equal, 1-nerved, acute, thin and hyaline; lemmas 3-nerved, acute, glabrous, awnless; pistillate spikelets 2-flowered; first glume 1–3-nerved, acute, thin and hyaline, the second 3-nerved, firmer, narrower, more than twice as long as the first; rachilla glabrous, disarticulating at the base of each segment; lemmas small, attenuate to a long soft awn, villous with long white hairs.

Very large perennial with short-jointed culms, broad, flat blades and large plume-like panicles.

Species 1, American tropics.

Gynerium sagittatum (Aubl.) Beauv. Ess. Agrost. 138. *pl.* 24, *f.* 6. 1812. *Saccharum sagittatum* Aubl. Pl. Guian. 1: 50. 1775. *Gynerium saccharoides* Humb. & Bonpl. Pl. Aequin. 2: 105. *pl.* 115. 1813. *Arundo saccharoides* Poir. in Lam. Encycl. Suppl. 4: 703. 1816. *Caña, caña de casa, caña de Castilla; in Honduras, caña brava.*

Rocky thickets, gravel bars, along rivers, and in rocky, brushy stream beds, 300–700 meters; Zacapa; Escuintla; Huehuetenango; Retalhuleu. Southern Mexico to Paraguay.

Very coarse, tall, leafy, perennial reed; culms as much as 15 meters high, with short internodes; sheaths much longer than the internodes, with a long densely villous patch on the back below the blade, also villous in the throat and on the margins near the summit, reticulate-veined, the lower ones soon falling off; blades sharply serrate, commonly 2 meters long, 4–6 cm. wide, forming a great fan-shaped summit to the sterile culms; panicles 1 meter or more long, erect, the branches drooping; pistillate spikelets: glumes very unequal, the first about 4 mm. long, the second 10–12 mm. long; body of lemma about 2 mm. long, tapering gradually into a soft delicate awn 3–4 mm. long, the hairs on the lemma exceeding the awns; staminate spikelets: glumes acute or subacuminate, the first 2–3 mm. long, the second a little broader, about 3 mm. long; lemmas 3 mm. long, acuminate, glabrous.

HACKELOCHLOA Kuntze

Spikelets very dissimilar, in pairs at the nodes of a disarticulating rachis, the rachis joints and pedicels grown together, more or less clasped by the margins of the first glume of the sessile spikelet; sessile spikelet globose, the first glume indurate, alveolate; pedicellate spikelet conspicuous, staminate or sterile, membranaceous, flattened, the first glume broad, rather strongly nerved, acute, the keels winged.

Annual grasses with flat blades and rather numerous short solitary racemes on the flowering branches from the middle and upper nodes. Monotypic.

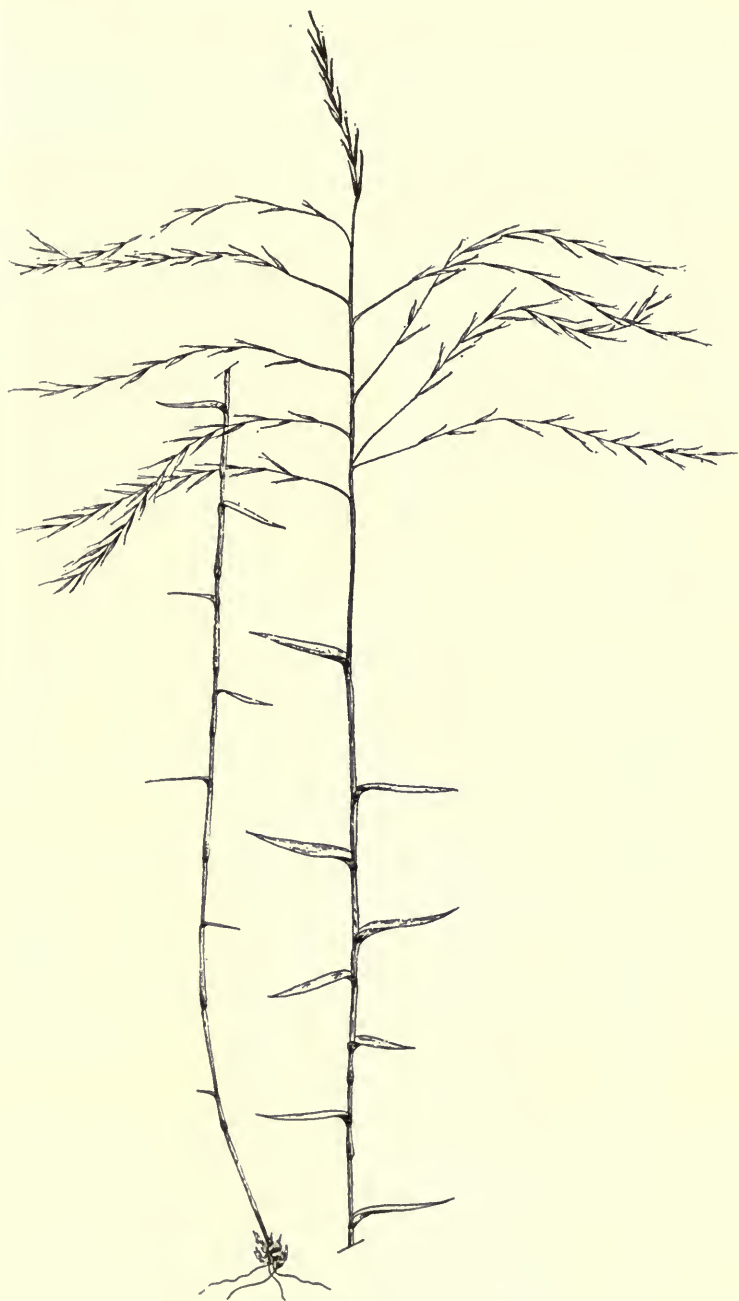


FIG. 46. *Gymnopogon spicatus*. Habit, $\times \frac{1}{3}$.

Hackelochloa granularis (L.) Kuntze, Rev. Gen. Pl. 776. 1891. *Cenchrus granularis* L. Mant. Pl. 2: 575. 1771. *Manisuris granularis* Swartz, Prodr. Veg. Ind. Occ. 25. 1788. *Rytilix granularis* Skeels, U. S. Dept. Agr. Bur. Pl. Ind. Bull. 282: 20. 1913. Figure 47.



FIG. 47. *Hackelochloa granularis*. Plant, $\times \frac{1}{2}$; single raceme, $\times 2$; two views of spikelet with rachis joint, $\times 5$.

Pine slopes, dry hills, and pine-oak uplands, up to 1,500 meters; Alta Verapaz; Chiquimula; Santa Rosa; Guatemala. British Honduras. A common weed in tropical regions around the world.

Annual; culms erect or ascending, 30–100 cm. high, freely branching, more or less papillose-hispid, especially below the nodes; sheaths short, densely and

conspicuously papillose-hispid; blades mostly 5–15 cm. long, 5–12 mm. wide, flat, papillose-hirsute on both surfaces, the margins ciliate; racemes numerous, short, partly enclosed in the subtending spathe; fertile spikelet 1 mm. long, the pedicellate spikelet 2 mm. long.

HETEROPOGON Pers.

Lower few pairs of spikelets alike, staminate, awnless, the remaining sessile spikelets fertile, long-awned, the pedicellate spikelets staminate like the lower ones; rachis continuous below, bearing the fertile spikelets above, disarticulating at base of each joint, the joint forming a sharp, barbed callus below the fertile spikelet; glumes of the fertile spikelet dark brown, coriaceous, the first glume enclosing the second one; glumes of the staminate spikelet membranaceous, broad, obscuring the fertile spikelets; lemmas hyaline, the fertile one with a long, stout, twisted, geniculate awn.

Annuals or perennials, with flat blades and solitary terminal racemes.

Species about 8, in warmer regions of both hemispheres, two widespread around the world.

Heteropogon contortus (L.) Beauv. ex Roem. & Schult. Syst. Veg. 2: 836. 1817. *Andropogon contortus* L. Sp. Pl. 1045. 1753. *Heteropogon firmus* Presl, Rel. Haenk. 1: 334. 1830. *Sorghum contortum* Kuntze, Rev. Gen. Pl. 2: 791. 1891. Figure 48.

Rocky hills, 1,400–1,500 meters; Guatemala; Huehuetenango. Arizona to Texas; Mexico and the West Indies to Argentina; warmer regions of both hemispheres. Apparently infrequent in Guatemala and other countries of Central America.

Culms erect, tufted, 20–80 cm. tall, glabrous, with a few flowering branches at the upper nodes; sheaths compressed, keeled, glabrous or scabrous, shorter than the internodes; blades 5–15 cm. long, 3–7 mm. wide, flat or usually folded, very scabrous on the upper surface and on the margins, the tip navicular; raceme usually long-exserted, 4–7 cm. long, the peduncle elongate; sessile spikelets about 7 mm. long, nearly hidden by the pedicellate spikelets, the first glume obtuse, strongly nerved, hirsute with spreading hairs, the awns 5–12 cm. long, hirsute, becoming implicate; pedicellate spikelet about 1 cm. long, the first glume sparsely papillose-hispid.

HIEROCHLOE R. Br.

Spikelets with 1 terminal perfect floret and 2 staminate florets, the rachilla disarticulating above the glumes, the staminate florets remaining attached to the fertile one; glumes equal or unequal, thin, acute, at least the second longer than the florets; florets about equal, the staminate hispidulous or hairy, awned or awnless, the fertile indurate, smooth or nearly so, awnless; palea 3-nerved, rounded on the back.

Slender, sweet-smelling, perennial grasses with open or contracted panicles of brown spikelets.

Species about 17, in cool or alpine regions of both hemispheres.



FIG. 48. *Heteropogon contortus*. Plant, $\times \frac{1}{2}$; fertile spikelet, $\times 5$.

Hierochloe mexicana (Rupr.) Benth. ex Hitchc. Contr. U. S. Nat. Herb. 24: 614. 1930. *Ataxia mexicana* Rupr. ex Fourn. Mex. Pl. 2: 71. 1886. *Savastana mexicana* Beal, Grasses N. Amer. 2: 187. 1896. *Torresia mexicana* Hitchc. Amer. Jour. Bot. 2: 301. 1915.

Dry slopes and pine forests, about 3,000 meters; Sacatepéquez; Huehuetenango. Mexico. Figure 49.

Perennial; culms erect, 30–60 cm. high; blades flat, usually elongate, 2–5 mm. wide, scabrous; panicles as much as 15 cm. long, narrow, rather dense, the branches appressed, spikelet-bearing to the base; first glume 5 mm. long, 1-nerved, the second 6–7 mm. long, 3-nerved; sterile florets 4–5 mm. long, rather densely pubescent, the first with a short straight awn from near the tip, the second with a geniculate twisted awn attached near the base, 4–5 mm. long; fertile lemma smooth, acute, 3 mm. long, awnless.

HILARIA H.B.K.

Spikelets arranged in groups of three, the central spikelet perfect, 1-flowered, the lateral ones staminate, 2-flowered, the groups falling entire; glumes asymmetric, those of the lateral spikelets bearing an awn on one side from about the middle, those of the fertile spikelet variously divided into lobes or awns; lemma and palea hyaline, nearly equal, the lemma 3-nerved, shallowly lobed, awnless or short-awned.

Stiff perennials with solid culms, narrow blades, and dense, narrow, terminal spikes.

Species 6, in arid regions, southwestern United States to Venezuela.

Hilaria cenchroides H.B.K. Nov. Gen. & Sp. 1: 117. 1815.

Plains and roadsides around Guatemala City. Mexico. Figure 50.

Low stoloniferous perennial; culms wiry, 10–25 cm. high, in small tufts at the nodes of the stolons, the nodes bearded; culm sheaths much shorter than the internodes; blades firm, flat, sharp-pointed, scabrous, commonly 1–5 cm. sometimes as much as 10 cm. long, 2–4 mm. wide; spikes solitary, 1–3 cm. long, black or purplish, the axis zigzag; groups of spikelets crowded, 4–5 mm. long.

HOMOLEPIS Chase

Spikelets lanceolate-acuminate, rather large, in open panicles; glumes similar, equal, or the first a little shorter, 7–9-nerved, completely covering the sterile lemma and fertile floret; sterile lemma thinner than the glumes, 7-nerved, villous between the lateral nerves, the back flat, the margins clasping the fertile floret; fruit acuminate, indurate, smooth and shining, the margins of the lemma broad, flat, or inrolled toward the tip.

Stoloniferous perennials with short flat blades and small narrow open panicles of large spikelets.

Species 3, in tropical America.



FIG. 49. *Hierochloa mexicana*. Inflorescence, $\times 2$; spikelet, $\times 10$.



FIG. 50. *Hilaria cenchroides*, about $\times 1$.

Homolepis aturensis (H.B.K.) Chase, Proc. Biol. Soc. Washington 24: 146. *f.* 12. 1921. *Panicum aturense* H.B.K. Nov. Gen. & Sp. 1: 103. *pl.* 33. 1815. *P. blepharophorum* Presl, Rel. Haenk. 1: 312. 1830. Figure 51.

Open meadows, thickets, and wet fields, up to 550 meters; Alta Verapaz; Izabal. British Honduras; southern Mexico to Bolivia and Brazil.

Stoloniferous perennial, the stolons determinate; culms slender, erect, ascending, sometimes geniculate, commonly 15–50 cm. long, or sometimes longer, glabrous; sheaths mostly shorter than the internodes, slightly inflated, glabrous on the back with a pubescent line on collar, the margins villous-ciliate; blades lanceolate, 5–12 cm. long, 1–1.5 cm. wide, acute, rounded or subcordate at the base, minutely cross-veined, the margins scabrous or sometimes very sparsely ciliate; stolon blades mostly 3–5 cm. long, 8–10 mm. wide; panicles 5–10 cm. long, narrow, the slender few-flowered branches narrowly ascending or appressed; spikelets about 7 mm. long, acuminate, glabrous.

HYMENACHNE Beauv.

Spikelets acuminate, short-pedicellate in dense spike-like or interrupted panicles; first glume acute or acuminate, 3–5-nerved, one-third to half as long as the spikelet, remote, a distinct stipe below the second glume; second glume and sterile lemma exceeding the fruit, 5-nerved, acuminate, the lemma longer than the glume, the tip awn-like; fruit membranaceous, pale, the margins of the lemma not inrolled, the tip of the palea not enclosed.

Coarse, aquatic perennials with long, broad, cordate, clasping blades and long, spike-like or open panicles with spreading, densely flowered branches.

Species about 10, tropics of both hemispheres.

Hymenachne amplexicaulis (Rudge) Nees, Agrost. Bras. 276. 1829. *Panicum amplexicaule* Rudge, Pl. Guian. 1: 21. *pl.* 27. 1805. Figure 52.

Swamps, ditches, and wet areas along rivers and streams at low altitudes; Alta Verapaz; Izabal; Retalhuleu. British Honduras; West Indies; southern Mexico to Argentina. Tropics of both hemispheres.

Coarse, aquatic perennial; culms succulent, slender or usually rather thick, sparingly branching, glabrous, the base creeping, rooting at the nodes, 1–2 meters long, or even longer; sheaths usually shorter than the internodes, glabrous or sometimes ciliate on the margins; blades commonly 15–35 cm. long, 1.5–3 cm. wide, or smaller on some of the branches, acuminate, gradually narrowed from the cordate-clasping base, the margins scabrous, more or less papillose-hispid-ciliate at the base; panicles 20–50 cm. long, sometimes shorter, 8–15 mm. thick, dense, spike-like, the lower branches often distant; spikelets 3–4 mm. long, acuminate, the second glume and sterile lemma rather prominently scabrous on the nerves, the lemma often awn-pointed.



FIG. 51. *Homolepis aturensis*, $\times \frac{2}{3}$.



FIG. 52. *Hymenachne amplexicaulis*, $\times \frac{1}{2}$.

HYPARRHENIA Anderss.

Spikelets arranged in pairs at the nodes of short, paired racemes, each pair subtended by a spathe, the lowest pairs alike, awnless, similar to the pedicellate spikelets above; first glume of sessile fertile spikelet flat or rounded, not keeled, or keeled only near the summit; lemma small and narrow, sometimes minutely lobed, with a relatively strong geniculate awn; pedicellate spikelets about as large as the sessile, awnless.

Tall coarse perennials with long narrow blades and rather loose inflorescences, the pairs of racemes somewhat crowded on the branches.

Species about 70, almost all in tropical and subtropical Africa, several introduced in America.

Racemes with one perfect spikelet; racemes nearly enclosed or protruding sideways from the spathe.

Racemes about 2 cm. long, erect; awns about 8 cm. long.....*H. dissoluta*.

Racemes about 1 cm. long, the peduncles curved or flexuous; awns 1.5–2 cm. long.....*H. bracteata*.

Racemes with more than one perfect spikelet; racemes exerted from the inconspicuous spathes.....*H. rufa*.

Hyparrhenia bracteata (Humb. & Bonpl.) Stapf in Prain, Fl. Trop. Afr. 9: 360. 1918. *Andropogon bracteatus* Humb. & Bonpl. ex Willd. Sp. Pl. 4: 914. 1806. *Cymbopogon bracteatus* Hitchc. Contr. U. S. Nat. Herb. 17: 209. 1913.

Marshy prairies to about 1,500 meters; Izabal; Santa Rosa. Southern Mexico; Honduras; El Salvador; Costa Rica; Panama; British Guiana; Colombia and Venezuela to Bolivia, Brazil, and Paraguay.

Perennial; culms in large clumps, erect, 0.5–1.5 meters, or sometimes 2 meters high, appressed-hirsute below the nodes; sheaths compressed, keeled, appressed-hirsute at least toward the summit, often densely hirsute all over, the lower ones elongate; ligule membranaceous, 1–2 mm. long; blades elongate, 2–4 mm. wide, flat, or loosely rolled on drying, glabrous or villous, with a bunch of long hairs just back of the ligule; inflorescence narrow and rather dense, the branches usually crowded toward the summit of the culm, usually short, appressed; racemes about 1 cm. long with 1 perfect spikelet, purple, the pairs protruding from the side of the narrow, hirsute spathes, the peduncle curved or flexuous, densely papillose-hirsute; fertile floret 5 mm. long, minutely bi-dentate, sulcate, hispid on the margins at the summit; awns 15–20 mm. long, twice-geniculate, brown, the lower segments tightly twisted, hirsute with pale or yellow hairs; pedicellate spikelets as large as the sessile, the first glume acuminate or awn-pointed.

Hyparrhenia dissoluta (Nees) C. E. Hubb. ex Hutch. & Dalziel, Fl. West Trop. Afr. 2: 591. 1936. *Anthistiria dissoluta* Nees in Steud. Syn. Pl. Glum. 1: 400. 1854. *Hyparrhenia rup-*

rechtii Fourn. Mex. Pl. 2: 67. 1886. *Andropogon ruprechtii* Hack. Flora 68: 126. 1885. *Cymbopogon ruprechtii* Rendle, Cat. Afr. Pl. Welw. 2: 160. 1899.

Steep rocky slopes, to about 1,400 meters; Zacapa; Santa Rosa; Huehuetenango. Southern Mexico; El Salvador; Nicaragua; Honduras; Colombia; Brazil; Paraguay; tropical Africa.

Perennial; culms rather stout, erect in small tufts, commonly 2–3 meters high; sheaths keeled toward the summit, glabrous or somewhat hairy above, the upper ones auriculate; blades mostly 15–30 cm. long, 3–8 mm. wide, often narrowed toward the base, firm, attenuate, scabrous; spathes crowded toward the ends of the branches, 5–8 cm. long, glabrous or hairy; pairs of racemes mostly enclosed in the spathes, about 2 cm. long, one sessile, the other pedicellate, each raceme with 1 fertile spikelet, only the lower raceme with 1 pair of homogamous spikelets; fertile spikelet with a sharp callus about 5 mm. long, the first glume firm, deeply sulcate on the back; awn of fertile lemma rather stout, geniculate, pilose, about 8 cm. long.

Hyparrhenia rufa (Nees) Stapf in Prain, Fl. Trop. Afr. 9: 304. 1918. *Trachypogon rufus* Nees, Agrost. Bras. 345. 1829. *Andropogon rufus* Kunth, Rév. Gram. 1: Suppl. XXXIX. 1830. *Cymbopogon rufus* Rendle, Cat. Afr. Pl. Welw. 2: 155. 1899. *Jaraguá*.

Brushy slopes and moist open ground, up to 1,400 meters; Petén; Izabal; Chiquimula. Commonly cultivated for forage in tropical America, often escaping or becoming naturalized. Introduced from tropical Africa.

Perennial; culms erect in large dense clumps 1–2.5 meters high, rarely less, or as much as 5 meters, glabrous; sheaths keeled toward the summit, glabrous or papillose-hirsute on the margins toward the summit and in the throat; ligule brown, membranaceous, 2–4 mm. long; blades linear, elongate, 2–8 mm. wide, glabrous or scaberulous, the margins sometimes scabrous; inflorescence 20–40 cm. long, loose and open, composed of several to numerous compound branches from the upper nodes; pairs of racemes terminating the ultimate branchlets, exserted from the narrow inconspicuous spathes, the peduncles commonly 4–6 cm. long, flexuous, pilose; racemes 2–3 cm. long, reddish brown, the rachis and sterile pedicels densely ciliate with rufous or sometimes yellowish hairs; sessile spikelets 3–4 mm. long; first glume acute or subobtusate, sparsely to densely covered with red hairs; awns 15–20 mm. long, twice-geniculate, brown, the lower segments tightly twisted, hispidulous; pedicellate spikelet as large as the sessile, acute, awnless.

ICHNANTHUS Beauv.

Spikelets paniculate or arranged on one-sided racemes or raceme-like branches; first glume acuminate, often nearly as long as the spikelet; second glume and sterile lemma subequal, pointed beyond the fruit, usually acuminate; fruit acute or subacute, the margins of the lemma usually flat, the rachilla disarticulating at the base of the segment, remaining attached to the fruit as a short stipe, this

bearing on either side membranaceous appendages adnate to the base of the lemma, the appendages or wings often much reduced or indicated only by scars.

Annuals or perennials of varying habit with relatively broad flat blades and terminal and axillary inflorescences.

Species at least 50, tropical America, two species in the tropics of the Old World.

Appendages of the lemma developed.

Culms coarse, trailing, more than 3 meters long; blades 15-35 cm. long.

I. mexicanus.

Culms relatively slender, less than 1 meter long, erect or decumbent at the base but scarcely trailing; blades less than 15 cm. long.

Panicle branches raceme-like, densely flowered; spikelets prominently papillose-hispid with long hairs, 6-7 mm. long. *I. standleyi.*

Panicle branches not raceme-like; spikelets glabrous or nearly so, not crowded.

Sheaths prominently villous; pedicels of spikelets slender, much longer than the spikelet. *I. villosus.*

Sheaths glabrous or only sparsely villous; pedicels of spikelets stout, much shorter than the spikelet. *I. lagotis.*

Appendages of the lemma reduced to scars.

Cells plainly visible with a lens on the under side of the blades.

Blades lanceolate, not more than 1.5 cm. wide, usually less; spikelets 4 mm. long. *I. brevivaginatius.*

Blades ovate or ovate lanceolate, 1.5-3 cm. wide; spikelets about 3 mm. long. *I. axillaris.*

Cells not visible with a lens on the under side of the blades.

Culms caespitose, erect or decumbent at the base, sparingly branching; blades often petiolate. *I. lanceolatus.*

Culms widely spreading, freely branching; blades not petiolate.

Peduncles long and slender; blades thin. *I. tenuis.*

Peduncles not long and slender; blades firm.

Inflorescences terminal and axillary, usually exserted. *I. pallens.*

Inflorescences usually terminal only, partly enclosed in the sheath.

Sheaths much shorter than the internodes; blades 7-14 mm. wide, very scabrous. *I. scaberrimus.*

Sheaths mostly longer than the short internodes; blades rarely more than 5 mm. wide, scabrous only on the margins. *I. gracilis.*

Ichnananthus axillaris (Nees) Hitchc. & Chase, Contr. U. S. Nat. Herb. 18: 334. 1917. *Panicum axillare* Nees, Agrost. Bras. 141. 1829.

Swamps and shady banks, up to 1,800 meters; Alta Verapaz; Izabal; Zacapa; Guatemala. British Honduras and the West Indies to Ecuador and Brazil.

Perennial; culms decumbent-spreading, rooting at the nodes, sometimes clambering in brush, as much as 1–1.5 meters long, the erect or ascending shoots or branches mostly 10–20 cm. long, glabrous or sparsely pubescent, the nodes villous; sheaths much shorter than the internodes, or overlapping on new shoots, usually densely villous; ligule truncate, about 1 mm. long; blades ovate or ovate-lanceolate, 3–9 cm. (sometimes 12 cm.) long, 1.5–3.5 cm. wide, acute, scabrous above, usually glabrous beneath; inflorescences terminal and axillary from the upper sheaths, partly included to long-exserted, rather dense, composed of few to numerous, stiffly ascending, approximate racemes, rather densely pubescent or pilose in the axils, the lower ones 2–4 cm. long; spikelets 3 mm. long, glabrous or sparsely pilose; glumes acuminate, scabrous on the keel, the first half to two-thirds as long as the spikelet; sterile lemma acute or subacuminate, a little shorter than the second glume, containing a well-developed palea and a staminate flower; fruit 1.8–2 mm. long, oblong-elliptic, with prominent scars at the base.

Ichnanthus brevivaginat Swallen, *Phytologia* 4, no. 7: 425. 1953.

Forests up to 300 meters; Alta Verapaz; Izabal. British Honduras, the type from Monkey River, Toledo District, *Gentle* 3971.

Annual; culms widely decumbent-spreading, the ascending flowering branches 20–30 cm. long; sheaths mostly 15–20 mm. long, much shorter than the internodes, usually rather densely pilose; blades lanceolate, as much as 9 cm. long, 15 mm. wide, acuminate, scabrous below, smooth above, the cells readily visible with a lens on the under surface; panicles terminal and sometimes axillary from the upper sheath, 4–7 cm. long, the branches appressed or ascending, the branchlets and spikelets appressed; spikelets 4 mm. long; first glume acute and about half as long as the spikelet to acuminate or attenuate and nearly as long as the spikelet, scabrous on the keel; second glume acuminate, usually longer than the acute sterile lemma; fruit 2.5 mm. long, acute, the wings reduced to scars.

The only other species of *Ichnanthus* having the cells plainly visible on the under surface of the blades is *I. axillaris*, which has shorter and broader ovate blades.

Ichnanthus gracilis Swallen, *Phytologia* 4, no. 7: 426. 1953.

Moist or cloud forests, 900–2,500 meters; Zacapa; Chiquimula; Suchitepéquez; San Marcos, the type from Volcán Tajumulco, *Steyermark* 37293.

Annual(?); culms slender, creeping, branching, elongate, glabrous, the flowering branches ascending, mostly about 15 cm. long; sheaths glabrous or sparsely pilose, the margins ciliate; blades 3–5.5 cm. long, 4–7 mm. wide, lanceolate, acute, scabrous on the margins, sometimes papillose-hispid on the upper surface toward the base; panicles about 3 cm. long, narrow, few-flowered, short-exserted or partly enclosed in the sheath; spikelets 3 mm. long; first glume abruptly acuminate, equaling the second glume or a little shorter, scabrous on the mid-nerve; second glume and sterile lemma subequal, the glume acute, the lemma subobtusely; fruit 2 mm. long, smooth and shining, the wings reduced to scars.

Ichnananthus lagotis (Trin.) Swallen, Jour. Washington Acad. Sci. 28: 10. 1938. *Panicum lagotis* Trin. Mém. Acad. St. Pétersb. VI. Sci. Nat. 1: 326. 1834.

Rare along roadside in limestone valley, San Antonio, El Cayo District, British Honduras, *Lundell* 6941. Not known from Guatemala. Eastern Brazil.

Annual; culms erect or ascending, rooting at the lower nodes, 30 cm. to more than 1 meter high, sparingly branching; sheaths much shorter than the internodes, villous on the collar and margins; blades asymmetrical, ovate-lanceolate, as much as 12 cm. long, 3.5 mm. wide, petiolate, with rather strong white margins; inflorescences terminal, 8–20 cm. long, the branches stiffly ascending to spreading, the lower as much as 10 cm. long; spikelets 6 mm. long, short-pedicellate, appressed; first glume acute, half as long as the spikelet; second glume and sterile lemma subequal, acute, strongly nerved, exceeding the fruit; fruit 5 mm. long, the wings broad, half as long as the floret.

Ichnananthus lanceolatus Scribn. & Smith, U. S. Dept. Agr. Div. Agrost. Bull. 4: 36. 1897.

Forests and open brushy places. British Honduras; Yucatan Peninsula.

Perennial; culms erect or decumbent at the base, 30–90 cm. high; blades ovate to lanceolate, as much as 11 cm. long and 3 cm. wide, frequently petiolate; panicle 5–15 cm. long, the branches stiffly ascending; spikelets 4–4.3 mm. long, appressed; first glume acute, clasping, half as long as the spikelet; second glume and sterile lemma equal, subacuminate, strongly nerved, exceeding the fruit; fruit 3 mm. long, blunt, the wings reduced to small scars.

Ichnananthus mexicanus Fourn. Mex. Pl. 2: 34. 1886.

Moist flats and open places in oak forests. Not known from Guatemala. British Honduras, without locality, *Kinloch* 72. Mexico (Oaxaca).

Perennial; culms rather coarse, trailing, more than 3 meters long, glabrous; sheaths overlapping or a little shorter than the internodes, densely ciliate on the margins, densely villous especially toward the summit, sometimes villous only on the collar; blades flat, more or less cordate at the base, attenuate-pointed, 15–35 cm. long, 18–30 mm. wide (the uppermost reduced), appressed-hispid on the upper surface, pubescent or glabrous on the lower; panicles 12–30 cm. long, densely flowered, the branches in small fascicles, stiffly ascending, becoming more or less spreading at maturity, spikelet-bearing from the base, as much as 10 cm. long; spikelets 4–4.5 mm. long, short-pedicellate, appressed, solitary or in small clusters; first glume acute, half to two-thirds as long as the spikelets, villous on the margins and at the apex or sometimes only scabrous; second glume and sterile lemma equal, scabrous; fruit 3 mm. long, chestnut brown at maturity, the appendages ovate-oblong, 0.5 mm. long.

Ichnanthus pallens (Swartz) Munro ex Benth. Fl. Hongk. 414. 1861. *Panicum pallens* Swartz, Prodr. Veg. Ind. Occ. 23. 1788. Figure 53.

Wet thickets, forests, and along trails, up to 1,000 meters; Petén; Alta Verapaz; Izabal; El Progreso; Escuintla; San Marcos.



FIG. 53. *Ichnanthus pallens*. Plant, $\times \frac{2}{3}$; spikelet and floret, $\times 10$.

British Honduras; southern Mexico and the West Indies to Argentina.

Perennial; culms decumbent or prostrate-spreading, sometimes clambering in brush, 50 cm. to more than 1.5 meters long, the erect or ascending shoots or branches as much as 55 cm. long, glabrous or sparsely pilose, the nodes not villous; sheaths much shorter than the internodes, glabrous or sparsely or rarely densely pilose or papillose-pilose, especially on the margins; ligule thin, erose or lacerate,

about 1 mm. long; blades lanceolate, acuminate, 5–12 cm. long, mostly 5–15 mm. wide, rounded and somewhat clasping at the more or less asymmetric base, thin, scaberulous, finely cross-veined; inflorescences terminal and axillary from the upper sheaths, long-exserted or the axillary ones appressed and partly included, usually not dense, the rather slender racemes ascending, the lower ones as much as 7 cm. long; spikelets 3–3.5 mm. long, glabrous or sparsely pilose or hirsute; first glume acuminate, half to two-thirds as long as the spikelet, scabrous on the keel; second glume and sterile lemma acuminate, subequal or the glume a little longer, the lemma enclosing a palea nearly as long as the lemma and sometimes a staminate flower; fruit 2 mm. long, oblong-elliptic, the scars extending downward into very narrow wings.

The spikelets are sometimes proliferous.

Ichnanthus scaberrimus Swallen, Contr. U. S. Nat. Herb. 29: 424. 1950.

Damp thickets and dense forests, 1,100–1,500 meters; Alta Verapaz; Quezaltenango, the type from Finca Pireneos, *Standley* 68296. British Honduras (Boquete and El Cayo Districts).

Perennial; culms somewhat woody, suberect or decumbent, about 65 cm. long, branching, glabrous; sheaths much shorter than the internodes, papillose-pilose near the margins, the collar pilose; ligule 0.4 mm. long, truncate, more or less ciliate; blades 6–12 cm. long, 7–14 mm. wide, lanceolate, acuminate, strongly nerved, the nerves approximate, glabrous or somewhat scabrous beneath, prominently scabrous above and on the margins; panicles 6–11 cm. long, 4–5 cm. wide, the branches stiffly ascending or spreading, the branchlets divaricate; spikelets 3–3.4 mm. long, appressed; first glume acuminate or attenuate, as long as the spikelet or somewhat shorter, 3-nerved, scabrous on the keel; second glume and sterile lemma subequal, 5-nerved, the glume abruptly acute or acuminate, the lemma blunt, somewhat cucullate; fruit 2.2 mm. long, 1.2 mm. wide, ovate, subacute, straw-colored, the wings reduced to scars, the scars 0.5 mm. long.

Ichnanthus standleyi Hitchc. Contr. U. S. Nat. Herb. 24: 662. 1930.

Ravines and along streams in forests. Not known from Guatemala. British Honduras (Mountain Pine Ridge and El Cayo Districts); Mexico (Chiapas); Honduras, the type from Siguatepeque, *Standley* 56207.

Perennial; culms erect or decumbent-spreading, freely branching, rooting at the nodes, the ascending fertile branches 60–75 cm. long, compressed, papillose, appressed-pilose, or nearly glabrous on the lower part; sheaths shorter than the internodes, glabrous or sparsely pilose, the margins densely short-ciliate; ligule densely ciliate, 0.5 mm. long; blades ovate-lanceolate to broadly lanceolate, 5–15 cm. long, 1.5–3 cm. wide (rarely smaller), pilose, scabrous, or nearly glabrous, with thick white scabrous margins, the petiolate base 2–4 mm. long; panicles 5–15 cm. long, with 3–5 stiffly ascending or spreading racemes, the lowermost 4–5 cm. long, the uppermost less than 1 cm. long, the main axis terminating with a single spikelet; rachis of racemes rather thick, triangular, scabrous or pubescent; spikelets 6–7 mm. long, more or less crowded; first glume equaling or exceeding

the spikelet, acuminate, 3-nerved, the keel scabrous to papillose-hispid, the margins papillose-ciliate with weak or coarse spreading hairs; second glume and sterile lemma equal, 5-nerved, the glume sparsely papillose-pilose to papillose-hispid on the keel and margins, the sterile lemma subglabrous; fruit 3 mm. long, white, with appendages 0.5 mm. long.

Ichnanthus tenuis (Presl) Hitchc. & Chase, Contr. U. S. Nat. Herb. 18: 334. 1917. *Oplismenus tenuis* Presl, Rel. Haenk. 1: 319. 1830. *Panicum exile* Steud. Nom. Bot. ed. 2. 2: 256. 1841. *P. alsinoides* Griseb. Fl. Brit. W. Ind. 550. 1864. *Ichnanthus alsinoides* Munro ex Hemsl. Biol. Centr. Amer. Bot. 3: 500. 1885.

Shady slopes, wet thickets, damp forests, sometimes on dry sandy soil and coffee plantations, up to 1,300 meters; Izabal; Chiquimula; Santa Rosa; Escuintla; Suchitepéquez. British Honduras and Trinidad to Colombia and Venezuela; Brazil.

Annual; culms forming large loose mats, very slender, elongate, decumbent or creeping, rooting at the nodes, freely branching, the erect or ascending branches 10–40 cm. long, pubescent or pilose, rarely nearly glabrous; sheaths usually much shorter than the internodes, pilose or papillose-pilose with spreading hairs; blades ovate to ovate-lanceolate or lanceolate, 1–5 cm. long, 4–10 mm. wide, thin, glabrous to pubescent and sparsely pilose; inflorescences terminal and axillary, long-exserted on slender peduncles, composed of 2–several slender to spreading racemes, pubescent or pilose in the axils, the lower ones 1–3 cm. long; spikelets 3–4 mm. long, appressed, sparsely pilose, especially on the margins of the glumes and sterile lemma; first glume acuminate or attenuate, almost aristate, two-thirds to nearly as long as the spikelet; second glume and sterile lemma acuminate, equal, or the glume a little longer, extending beyond the fruit; fruit 2–2.5 mm. long, oblong-elliptic, the wings reduced to inconspicuous scars.

The spikelets are frequently proliferous and sterile, composed of few to several herbaceous lemmas.

Ichnanthus villosus Swallen, Jour. Washington Acad. Sci. 28: 10. 1938. *I. dasycoleos* Tutin, Jour. Bot. Brit. & For. 72: 337. fig. 8, a. 1934.

In sand along creeks; El Cayo District, British Honduras, the type from Vaquero, Mountain Pine Ridge, Lundell 6852. British Guiana (Kaieteur Savannah).

Perennial; culms erect or decumbent at the base and rooting at the lower nodes, 90–110 cm. long, sparingly branched; sheaths shorter than the internodes, rather densely villous; ligule membranaceous, truncate, more or less ciliate, 0.5 mm. long; blades lanceolate, acuminate, asymmetric, 8–13 cm. long, 12–20 mm. wide, softly pubescent on the lower surface, scabrous and pilose on the upper; panicle about 25 cm. long, the slender branches stiffly spreading, the middle ones longest, as much as 11 cm. long, with one to few branchlets at the very base; spikelets 4–4.5 mm. long, appressed, usually in pairs, one on a pedicel 8–20 mm. long, the other on a much shorter pedicel; first glume acute or subacuminate,

3-nerved, scabrous; second glume and sterile lemma nearly equal, acute or blunt, 5-nerved, more or less scabrous, extending well beyond the fruit; fruit 3.3 mm. long, narrowly elliptic, blunt, smooth, shining, the wings subhyaline, 0.7–0.8 mm. long, rather broad.

IMPERATA Cyrillo

Spikelets all alike, in pairs, unequally pediceled on a slender continuous rachis of a raceme, surrounded at the base by long silky hairs much longer than the spikelets; pedicels of the spikelets enlarged at the summit in a shallow-cupped receptacle; glumes about equal, acuminate, the first 5–7-nerved; sterile lemma, fertile lemma, and palea hyaline, the fertile lemma awnless.

Tough perennial grasses with long, rather stout rhizomes, flat blades narrowed to a petiole-like base, and narrow silky inflorescences.

Species about 7, in warm regions of both hemispheres.

Panicles 30–40 cm. long, the lower branches ascending or spreading; spikelets 3 mm. long.....*I. contracta*.

Panicles not more than 15 cm. long, the branches appressed; spikelets 4 mm. long.....*I. brasiliensis*.

Imperata brasiliensis Trin. Mém. Acad. St. Pétersb. VI. Math. Phys. Nat. 2: 331. 1832.

Pine ridges, up to 1,350 meters; Alta Verapaz; Izabal. Florida; southern Mexico; El Salvador; Costa Rica; Venezuela to Surinam, Bolivia, Brazil, and Argentina.

Culms erect from deep scaly rhizomes, mostly 50–100 cm. high, the basal sheaths becoming conspicuously fibrous with age; blades 3–10 mm. wide, the lower ones narrowed to a long petiole-like base, conspicuously villous on the upper surface toward the base; panicles 8–15 cm. long, 1.5–2 cm. wide, dense, silvery, the branches appressed; spikelets 4 mm. long, obscured by the hairs.

Imperata contracta (H.B.K.) Hitchc. Rep. Mo. Bot. Gard. 4: 146. 1893. *Saccharum contractum* H.B.K. Nov. Gen. & Sp. 1: 182. 1816.

Meadows and grasslands at low altitudes; Petén; Izabal. West Indies; southern Mexico; El Salvador; Costa Rica; Panama; Colombia to Surinam, Peru, and Brazil.

Strongly rhizomatous perennial; culms erect, solitary or a few together, 1–1.5 meters high; sheaths much longer than the internodes, rounded or keeled toward the summit, glabrous, the lower ones bladeless; ligule brown, not more than 0.5 mm. long; blades elongate, attenuate, usually some of them narrowed to a long petiole-like base, narrower than the mouth of the sheath, 5–10 mm. wide, the margins very scabrous; panicles mostly 30–40 cm. long, narrowed-attenuate toward the summit, the upper branches short and appressed, the lower ones

slender, ascending to spreading, somewhat curved or flexuous, commonly 5–10 cm. long; spikelets 3 mm. long, obscured by the long silky hairs on the glumes and callus.

ISACHNE R. Br.

Spikelets subglobose with two well-developed florets, the lower perfect or staminate, indurate and similar to the upper, or herbaceous and similar to the glumes, the rachilla segment between the florets evident; glumes equal, similar, shorter than the spikelet, exposing the florets; fruit plano-convex, indurate, the narrow margins of the lemma inrolled.

Herbaceous or sometimes woody annuals or perennials with flat blades and open or condensed panicles.

About 25 species, in the tropics of both hemispheres.

Plants annual; culms slender, creeping, with broad, thin, cordate blades. Fruit densely pubescent. *I. polygonoides*.

Plants perennial; culms usually coarse, woody, the blades firm, not cordate.

Culms coarse, 1–6 meters long; blades more than 5 cm., usually more than 10 cm., long.

Spikelets 1.5–1.8 mm. long, clustered at the ends of the branches, these divided above the middle. *I. arundinacea*.

Spikelets 1.9–2 mm. long, evenly distributed on the branches, these divided from near the base. *I. pubescens*.

Culms slender, trailing, the blades of the branches 1–3 cm. long, 2–3 mm. wide. *I. rigens*.

***Isachne arundinacea* (Swartz) Griseb. Fl. Brit. W. Ind. 553.**

1864. *Panicum arundinaceum* Swartz, Prodr. Veg. Ind. Occ. 24.
1788.

Dry thickets, steep slopes, and wet pine forests, about 1,400 meters; Alta Verapaz; Izabal; Suchitepéquez. Southern Mexico; Nicaragua; Panama to Peru; Jamaica, Trinidad, and Windward Islands.

Coarse woody perennial; culms cane-like, clambering, 1–6 meters long, freely branching, the branches drooping, elongate; sheaths of the main culm much shorter than the internodes, those of the branches overlapping, glabrous to papillose-hispid, especially on the margins; ligule ciliate, 2–3 mm. long; blades 10–20 cm. long, 1–2 cm. wide, acuminate, scabrous, especially on the margins, and sometimes shortly hispid; panicles 6–12 cm. long, the branches stiffly ascending or finally spreading, naked toward the base; spikelets 1.5–1.8 mm. long, clustered at the ends of the branches; glumes equal, similar, shorter than the fruits, glabrous or sparsely hispid; fertile florets similar in texture, glabrous on the back, sparsely pilose at the base, the first elliptic, acutish, the second smaller, oblong.

Isachne polygonoides (Lam.) Doell in Mart. Fl. Bras. 2(2): 273. 1877. *Panicum polygonoides* Lam. Encycl. 4: 742. 1798. *P. trachyspermum* Nees, Agrost. Bras. 212. 1829. *Isachne trachyspermum* Nees in Seem. Bot. Voy. Herald 224. 1857.

Wet savannas, swamps, and along ditches and streams, up to about 1,000 meters; Izabal; Santa Rosa. West Indies; Honduras; Costa Rica; Panama to Peru and northern Brazil.

Decumbent-spreading annual; culms slender, glabrous, ascending, rooting at the nodes, sometimes geniculate, freely branching, the erect shoots finally bearing fascicled branchlets; sheaths much shorter than the internodes, papillose-hirsute to nearly glabrous, the margins usually ciliate; ligule ciliate; blades ovate-lanceolate, 1-5 cm. long, 5-15 mm. wide, very scabrous, papillose-hispid-ciliate at the rounded base; panicles 5-10 cm. long, nearly as wide, partly enclosed in the sheath, the branches and branchlets stiffly spreading or even reflexed, implicate, glandular spotted; spikelets 1.5-1.7 mm. long, glabrous; first floret as long as the second glume, similar in texture, not indurate, glabrous; fruit about 1.2 mm. long, strongly plano-convex, densely pubescent.

Isachne pubescens Swallen, Contr. U. S. Nat. Herb. 29: 426. 1950.

Bluffs, banks, and pine woods, up to 1,000 meters; Petén; Alta Verapaz, the type from Secanquim, *Pittier* 252; Izabal; Huehuetenango. Mexico (Veracruz).

Perennial(?); culms scandent or clambering, branching, pubescent below the panicle; sheaths about as long as the internodes, rather densely papillose-pilose, the margins conspicuously ciliate; ligule composed of hairs 2-3 mm. long; blades 5-16 cm. long, mostly 10-14 mm. wide, acuminate, velvety pubescent, papillose-pilose above; panicles 8-12 cm. long, about 4-8 cm. wide, the axis and branches rather densely appressed-pilose, the branches ascending, branching from near the base, rather evenly flowered, the spikelets not clustered toward the ends of the branchlets; spikelets 1.9-2 mm. long, the glumes equal, shorter and narrower than the first floret, sparsely appressed-pilose toward the summit; first floret 1.8 mm. long, sparsely pilose on the margins; second floret 1 mm. long, sub-hemispheric, the rachilla joint short-pilose at the summit.

Isachne rigens (Swartz) Trin. Gram. Pan. 252. 1826. *Panicum rigens* Swartz, Prodr. Veg. Ind. Occ. 23. 1788.

Summit of Cerro Cananá, between Nucapuxlac and Cananá, Sierra de los Cuchumatanes, Dept. Huehuetenango, 2,800 meters, *Steyermark* 49031. Jamaica; Venezuela; Colombia; Ecuador.

Culms tufted, erect or trailing, wiry, usually branching, the branches sometimes crowded in rather dense fascicles; sheaths of the main culm much shorter than the internodes, those of the branches crowded, glabrous to pilose, the margins ciliate; blades scabrous, stiffly spreading, those of the culm as much as 7 cm. long, 8 mm. wide, but usually less, those of the branches reduced, mostly 1-3 cm. long,

2-3 mm. wide; panicles 2-5 cm. long, the branches and branchlets stiffly ascending or spreading; spikelets 1.8-2 mm. long, the pedicels 1-2 mm. long, spreading; glumes subequal, shorter than the first floret, hispidulous or nearly glabrous; rachilla between the florets villous; florets glabrous or nearly so, the lower 1.7 mm. long, the upper 1.2 mm. long.

The specimen mentioned above is the first record for this species in Central America. It consists of a fascicle of branches, and does not show the trailing habit.

ISCHAEMUM L.

Spikelets in pairs, all alike, perfect, but the pedicellate spikelet not always fruitful, the rachis and pedicels of the disarticulating racemes thickened; first glume indurate and rounded below, flattened, herbaceous and sometimes winged above, often cross-wrinkled or rigid, the narrow margins sharply inflexed; sterile lemma hyaline, as long as the glumes, enclosing a well-developed palea and staminate flower; fertile lemma hyaline, deeply bifid, awned from between the teeth, the awn geniculate, tightly twisted below the bend.

Branching annuals or perennials, often decumbent-spreading, with flat blades and rather thick racemes, digitate or flabellate at the ends of the branches.

Species about 50, mostly in the tropics of the Old World.

Ischaemum latifolium (Spreng.) Kunth, Rév. Gram. 1: 168. 1829. *Andropogon latifolium* Spreng. Syst. Veg. 1: 286. 1825. *Carricillo* (Izabal).

Moist ground, along ditches and in open places, sometimes in coffee plantations, up to 1,300 meters; Alta Verapaz; Izabal; Retalhuleu. British Honduras; Mexico to Costa Rica; West Indies; Colombia and Venezuela to Ecuador and Brazil.

Annual; culms freely branching, decumbent or widely spreading, rooting at the lower nodes, as much as 3 meters long; sheaths densely hairy on the collar, otherwise glabrous; blades 10-20 cm. long, 1-3 cm. wide, acuminate, narrowed toward the base, the margins scabrous; inflorescence pale or purplish, flabellate, composed of few to several racemes aggregate on a short axis; racemes 4-8 cm. long, usually somewhat flexuous, the rachis joints and pedicels rather densely hairy; spikelets about 4 mm. long, bearing a geniculate awn 8-12 mm. long.

IXOPHORUS Schlecht.

Spikelets solitary, short-pedicellate, arranged on two sides of a narrow triangular rachis, each subtended by a single bristle, the bristle persistent, the spikelet readily deciduous; first glume triangular, 3-nerved, one-fourth the length of the spikelet; second glume and sterile lemma equal, acute, the glume many-nerved, the lemma 5-nerved, the latter enclosing a palea and staminate flower, the palea winged at maturity, broader than the spikelet; fruit a little shorter than the sterile lemma, indurate, minutely roughened.



FIG. 54. *Ixophorus unisetus*, $\times \frac{1}{2}$.

Annual grasses with flat linear blades and panicles of numerous racemes. Monotypic.

Ixophorus unisetus (Presl) Schlecht. *Linnaea* 31: 420. 747. 1862. *Urochloa unisetata* Presl, Rel. Haenk. 1: 319. 1830. *Panicum unisetum* Trin. Mém. Acad. St. Pétersb. VI. Sci. Nat. 1: 217. 1834. *Setaria unisetata* Fourn. in Hemsl. Biol. Centr. Amer. Bot. 3: 506. 1885. *S. cirrhosa* Fourn. Mex. Pl. 2: 43. 1886. *Mezmet* (Chiquimula). Figure 54.

Open slopes, cultivated ground and waste places, at low altitudes; Izabal; Chiquimula; Escuintla. Mexico; Nicaragua; El Salvador; Honduras; Costa Rica; Cuba; Colombia; Venezuela. Used for forage.

Culms erect to spreading, rather coarse but succulent, as much as 1.5 meters long, branching; sheaths smooth, compressed, keeled; blades as much as 60 cm. long and 4 cm. wide, the margins scabrous; inflorescence 10–20 cm. long, about 5 cm. wide, the usually numerous racemes ascending, approximate, the lower ones as much as 8 cm. long, the upper ones gradually shorter and more crowded; spikelets 4–5 mm. long, glabrous, the subtending bristle 3–10 mm. long, smooth or scabrous.

JOUVEA Fourn.

Dioecious; staminate spikelets several- to many-flowered, sessile, somewhat distant on opposite sides of the rachis, forming a terminal spike, the florets closely imbricate; glumes shorter than the first floret; lemmas 3-nerved, acute, awnless; pistillate spikelets in the axils of the leaves, single or in fascicles of 3 or 4, terete, somewhat curved, acuminate, consisting of 2–5 florets imbedded in the spongy tissue of the rachilla, only the summit of the floret free; style and base of stigma elongate, 2-lobed.

Tough, wiry, stoloniferous perennials.

Species 2, in Mexico and Central America.

Pistillate spikelets single in the axils of the leaves; plants slender. . . . *J. straminea*.

Pistillate spikelets in fascicles; plants relatively stout. *J. pilosa*.

Jouvea pilosa (Presl) Scribn. Bull. Torrey Club 23: 143. 1896. *Brizopyrum pilosum* Presl, Rel. Haenk. 1: 280. 1830. *Rhachidospermum mexicanum* Vasey, Bot. Gaz. 15: 110. pl. 12. 1890.

Sand dunes and beaches, San José, Escuintla. Mexico; El Salvador; Nicaragua.

Culms erect or ascending, commonly 15–30 cm. tall, branching from all the nodes, the branches short, appressed; sheaths of the main culm much shorter than internodes, those of the branches crowded; blades 4–14 cm. long, 2–4 mm. wide,

flat or usually loosely folded, pungent, stiffly spreading, often curved or arcuate, glabrous beneath, scabrous above; staminate spikes terminal and axillary, short-exserted from the upper sheaths, few-flowered, the spikelets appressed; pistillate spikes partly enclosed in short congested uppermost sheaths forming a thorny mass.



FIG. 55. *Jouvea straminea*, about $\times \frac{1}{2}$.

Jouvea straminea Fourn. Bull. Soc. Bot. Belg. 15: 475. 1876.
Figure 55.

Abundant in low wet salt marshes on landward side of beach ridge, San José, Escuintla, *Weatherwax* 139. Mexico (Acapulco); El Salvador; Panama.

Tough, wiry, extensively stoloniferous perennial; culms slender, erect from a dense knotty crown, branching, 10–35 cm., rarely as much as 60 cm., high; lowermost sheaths very short, crowded, with reduced blades, the upper ones much shorter than the long internodes, glabrous, villous at the throat; blades flat or becoming involute, firm, stiffly ascending or spreading, 2–6 cm. long, 1–3 mm. wide, scabrous; staminate inflorescences 2–3 cm. long, scarcely exserted from the sheath, bearing 2–3 spikelets; spikelets 4–8-flowered; glumes acuminate, unequal, the first sometimes much reduced, the second 4–5 mm. long; lemmas acute or acuminate, about 4 mm. long, glabrous; anthers 2 mm. long; pistillate inflorescences 2–3 together, not crowded; spikelets 15–25 mm. long, 2–4-flowered, slender, pointed, arcuate.

LAMARCKIA Moench

Spikelets borne in fascicles, one of them fertile, the others sterile; fertile spikelet 2-flowered, the florets raised on a slender stipe, the lower fertile, the upper rudimentary, both awned; glumes narrow, acuminate, 1-nerved; lemma broader, scarcely nerved, bearing a delicate awn below the apex; sterile spikelets linear, composed of numerous imbricate, obtuse, awnless, empty lemmas.

Low annual with flat blades and dense oblong panicles, the fertile spikelets hidden by the numerous sterile ones. Monotypic.

Lamarckia aurea (L.) Moench, Meth. Pl. 201. 1794. *Cynosurus aureus* L. Sp. Pl. 73. 1753. *Achyrodes aureum* Kuntze, Rev. Gen. Pl. 2: 758. 1891. Figure 56.

A weed around Guatemala City, collected by Seler in 1896. A Mediterranean species, naturalized in California and Baja California; Colombia; Brazil; Chile. Probably adventive in Guatemala.

Annual; culms tufted, erect or decumbent at the base, 10–40 cm. high; blades soft, lax, flat, commonly 2–4 mm. wide; panicles 2–7 cm. long, dense, the branches appressed, the fascicles of spikelets spreading or reflexed, with a tuft of long hairs at the base; fertile spikelet 2 mm. long; sterile spikelets 6–8 mm. long.

LASIACIS (Griseb.) Hitchc.

Spikelets paniculate, subglobose, somewhat inflated, placed obliquely on the pedicels; glumes and sterile lemma papery, usually lanate-pubescent at the tip; first glume one-third to one-half as long as the spikelet, broad and clasping, the second glume and sterile lemma nearly equal, a little shorter to a little longer than the fertile floret; fruit bony-indurate, blunt, the lemma and palea with a tuft of short hairs from a minute depression at the tip, the margins of the lemma firm but not inrolled; palea convex above, the tip often free at maturity.

Trailing vines or coarse, woody, cane-like, high-clambering grasses with fascicled branches and open or sometimes contracted panicles terminating the culm and leafy branches, the blades and panicles of the branches usually reduced.

Species at least 20, in tropical America.



FIG. 56. *Lamarckia aurea*. Plant, $\times \frac{1}{2}$; fertile spikelet and floret, $\times 5$.

Blades cordate-clasping, usually elongate, as much as 5 cm. wide. Erect, coarse, semi-woody annual. *L. procerrima*.

Blades not cordate-clasping.

Plants without a strong central cane, creeping or low-clambering, rooting at the lower nodes.

Ligule short, inconspicuous.

Blades lanceolate or ovate-lanceolate, 1.5–3 cm. wide. *L. rhizophora*.

Blades narrowly lanceolate, 5–10 mm. wide. *L. grisebachii*.

Ligule conspicuous, 2–5 mm. long, brown.

Panicles 5–6 cm. long, usually partly enclosed in the sheath; blades elliptic-lanceolate, rarely more than 12 cm. long. *L. scabrior*.

Panicles 10–30 cm. long; blades linear or narrowly lanceolate, as much as 22 cm. long.

Blades linear; sheaths densely villous; spikelets solitary, long-pedicellate. *L. linearis*.

Blades narrowly lanceolate; sheaths glabrous on the back; spikelets usually in pairs, short-pedicellate. *L. oaxacensis*.

Plants with a strong central cane, erect or clambering.

Blades glabrous on both surfaces.

Blades 1.5–3.5 cm. wide, ovate-lanceolate, smooth and shining; panicles 15–25 cm. long. *L. sloanei*.

Blades mostly less than 1 cm. wide, narrowly lanceolate; panicles 5–10 cm. long. *L. divaricata*.

Blades usually pubescent on one or both surfaces.

Culms densely papillose-pilose; blades usually conspicuously distichous. *L. papillosa*.

Culms glabrous; blades not conspicuously distichous.

Blades lanceolate; panicles open, loosely flowered; spikelets 4–5 mm. long. *L. sorghoidea*.

Blades ovate-lanceolate or elliptic, asymmetric; panicles, or at least the branches, compactly flowered; spikelets 3–4 mm. long.

. *L. ruscifolia*.

***Lasiacis divaricata* (L.) Hitchc.** Contr. U. S. Nat. Herb. 15: 16. 1910. *Panicum divaricatum* L. Syst. Nat. ed. 10. 2: 871. 1759. Figure 57.

Moist thickets and forest borders, up to 2,500 meters; Petén; Alta Verapaz; Izabal; Zacapa; Santa Rosa; Huehuetenango; Quezaltenango. Southern Florida; West Indies; Mexico to Bolivia and northern Argentina.

Culms clambering, as much as 4 meters long, freely branching, glabrous or sometimes sparsely pilose, the branches often fascicled, the secondary shoots strongly divaricate or zigzag; sheaths glabrous on the back, the margins densely villous; blades narrowly lanceolate, 5–15 cm. long, 5–10 (15) mm. wide, glabrous, the margins scabrous; panicles commonly 5–8 cm. long, or the primary as much as 20 cm. long, the few-flowered scabrous and sparsely pilose branches 1–5 cm.

long, spreading or reflexed, the panicles of the ultimate branchlets much reduced; spikelets 4 mm. long.

Lasiacis grisebachii (Nash) Hitchc. Bot. Gaz. 51: 302. 1911.
Panicum grisebachii Nash, Bull. Torrey Club 35: 301. 1908.

Thickets and dense mixed forests, up to 1,400 meters; Petén; Quezaltenango. British Honduras; southeastern Mexico; Cuba; Honduras.

Culms slender, creeping, freely branching, rooting at the nodes, the fertile shoots 20–40 cm. long, erect or ascending, the internodes with a densely pubescent line; sheaths hispid, especially on the margins; ligule inconspicuous; blades narrowly lanceolate, 6–12 cm. long, 5–10 mm. wide, pubescent beneath; panicles 5–10 cm. long, few-flowered, the few rather short branches stiffly ascending; spikelets 4 mm. long.

Lasiacis linearis Swallen, Phytologia 4, no. 7: 427. 1953.

Pine-covered canyon bordering Río Lima, Sierra de las Minas, below Finca Alejandría, Dept. Zacapa, 2,000 meters. Known only from the type, *Steyermark* 30046.

Culms relatively slender, straggling, the flowering branches about 75 cm. long; sheaths densely villous, as long as or longer than the internodes; ligule 2–4 mm. long, brown; blades linear, acuminate, narrowed toward the base, 16–22 cm. long, 5–9 mm. wide, scabrous, sometimes sparsely pilose; panicle about 30 cm. long, the slender scabrous branches rather narrowly ascending, solitary, distant, bearing a few long-pedicellate spikelets; spikelets 4 mm. long, usually erect.

Lasiacis oaxacensis (Steud.) Hitchc. Proc. Biol. Soc. Washington 24: 145. 1911. *Panicum oaxacense* Steud. Syn. Pl. Glum. 1: 73. 1854.

Dry forests, brushy hillsides, and wet thickets, up to 1,500 meters; Izabal; Guatemala; Retalhuleu. West Indies; Mexico to Peru.

Culms relatively slender, as much as 3 meters long, erect or usually reclining, rooting at the nodes with no strong central cane, the ascending branches often 1–2 meters long, glabrous; sheaths glabrous on the back, densely villous on the margins; ligule conspicuous, 2–5 mm. long, brown; blades narrowly lanceolate, acuminate, 14–22 cm. long, 7–20 mm. wide, glabrous, the margins scabrous; panicles 10–25 cm. long, the branches ascending to spreading, glabrous in the axils, usually naked in the lower half, the branchlets narrowly ascending, not implicate, bearing a few spikelets at the ends; spikelets 4 mm. long, roughly globose, usually appressed.

Lasiacis papillosa Swallen, Carnegie Inst. Wash. Pub. No. 436: 349. 1934.



FIG. 57. *Lasiacis divaricata*. Plant, $\times \frac{1}{2}$; spikelet and floret, $\times 10$.

Brushy borders and thickets, up to 975 meters; Alta Verapaz (Tamahú), *Standley* 91779. British Honduras; eastern Mexico, the type from Peto, Yucatan, *Swallen* 2707.

Culms erect or clambering over brush, 1-2 meters long, densely papillose-pilose with appressed hairs; sheaths densely pubescent, or those of the young shoots nearly glabrous, long-ciliate toward the summit; blades ovate-lanceolate, 2-7 cm. long, mostly 10-15 mm. wide, conspicuously distichous, pubescent on both surfaces, those of the young shoots lanceolate, often much reduced; flowering branches strongly zigzag with short internodes, the branchlets solitary or fascicled, often reflexed; panicles 5-12 cm. long, the few distant pubescent branches stiffly spreading or reflexed, the lower 3-5 cm. long; spikelets 4.5 mm. long.

Lasiacis procerrima (Hack.) Hitchc. Proc. Biol. Soc. Washington 24: 145. 1911. *Panicum procerrimum* Hack. Oesterr. Bot. Zeitschr. 51: 431. 1901.

Pine slopes, thickets, open banks, and jungle borders, up to 1,500 meters; Alta Verapaz; Izabal; Zacapa; Santa Rosa; Guatemala; Quezaltenango. Mexico to Brazil and Peru.

Coarse semi-woody annual; culms 1-4 meters high, erect, single or usually several together in a loose clump, from a woody branching base, the upper internodes very short; sheaths glabrous, sometimes ciliate on the margins, the lower shorter than the internodes, the upper ones closely overlapping; ligule membranaceous, about 1 mm. long; blades 15-40 cm. long, 2-5 cm. wide, often distichous, acuminate, cordate-clasping at the base, glabrous, the margins scabrous; panicles as much as 1 meter long, diffuse, the lower branches whorled, naked below, ascending or finally spreading, as much as 40 cm. long; spikelets 3 mm. long, the lateral ones short-pedicellate.

Lasiacis rhizophora (Fourn.) Hitchc. Proc. Biol. Soc. Washington 24: 145. 1911. *Panicum rhizophorum* Fourn. Mex. Pl. 2: 31. 1886.

Moist brushy hillsides, shady ravines, oak woods, and cloud forests, 500-1,800 meters; Alta Verapaz; Chiquimula; Jalapa; Santa Rosa; Guatemala; Sacatepéquez; Suchitepéquez; Huehuetenango; Quezaltenango. Southern Mexico; Costa Rica; Honduras; Nicaragua.

Culms straggling, branching, rooting at the lower nodes, the flowering branches 30-100 cm. long; sheaths papillose-hispid or nearly glabrous; ligule inconspicuous; blades 7-14 cm. long, 1.5-3 cm. wide, lanceolate or ovate-lanceolate, acuminate, somewhat asymmetrical, scabrous, sometimes papillose-hispid or glabrate; panicles 8-15 cm. long, the branches stiffly ascending, naked below; spikelets 3-4 mm. long, densely clustered at the ends of the branchlets.

Lasiacis ruscifolia (H.B.K.) Hitchc. Proc. Biol. Soc. Washington 24: 145. 1911. *Panicum ruscifolium* H.B.K. Nov. Gen. & Sp.

1: 101. 1815. *P. compactum* Swartz, Adnot. Bot. 14. 1829. *P. liebmannianum* Fourn. Mex. Pl. 2: 33. 1886. *Lasiacis compacta* Hitchc. Bot. Gaz. 51: 302. 1911. *L. liebmanniana* Hitchc. Proc. Biol. Soc. Washington 24: 145. 1911.

Thickets, along streams in shady ravines, brushy slopes, and grassy slopes in pine woods, up to 1,300 meters; Petén; Alta Verapaz; Izabal; Zacapa; Chiquimula; Jalapa; Jutiapa; Santa Rosa; Retalhuleu. West Indies; Mexico to Peru and Argentina.

Very robust, with a strong central cane; culms clambering, several meters high, usually glabrous, freely branching; sheaths usually shorter, sometimes a little longer than the internodes, glabrous or rarely hispid, the margins glabrous or sometimes villous; ligule inconspicuous; blades usually asymmetrical, ovate-lanceolate to lanceolate, acuminate, the primary ones 10–15 cm. long, 3–6 cm. wide, those of the branches, especially the secondary branches, often much smaller, softly pubescent to glabrous on the lower surface, the upper surface glabrous or scabrous; panicles 5–20 cm. long, narrow, compact, or the lower branches somewhat distant and spreading, but densely flowered, the whole panicle sometimes open, with implicate loosely flowered branches; spikelets 3–4 mm. long, green, nearly globose, at least at maturity.

Lasiacis scabrior Hitchc. Proc. Biol. Soc. Washington 40: 85. 1927.

Border of forest at Cubilgüitz, Dept. Alta Verapaz, 350 meters, *Tuerckheim* 4036, type. Southern Mexico (Veracruz); Nicaragua; Costa Rica; Panama; Colombia; Ecuador.

Culms climbing or straggling, as much as 3 meters long, usually papillose-pilose; sheaths papillose-hispid, densely villous on the margins; ligule prominent, brown, 3–5 mm. long; blades elliptic-lanceolate, mostly 8–12 cm. long, 1–1.5 cm. wide, scabrous above, pubescent beneath; panicles short-exserted or partly enclosed in the sheath, mostly 5–6 cm. long, about as wide, the branches spreading, or the lower reflexed, pubescent; spikelets 4 mm. long, pale.

Lasiacis sloanei (Griseb.) Hitchc. Bot. Gaz. 51: 302. 1911. *Panicum latifolium* Hamilt. Prodr. Pl. Ind. Occ. 10. 1825. Not *P. latifolium* L., 1753. *P. sloanei* Griseb. Fl. Brit. W. Ind. 551. 1864.

Thickets and secondary forests; Petén; Quezaltenango. British Honduras; West Indies; eastern Mexico; Honduras; Nicaragua; Costa Rica; Colombia and Venezuela.

Culms widely spreading or clambering with long flowering branches; sheaths villous on the collar and margins, otherwise glabrous; ligule very short; blades ovate-lanceolate, somewhat asymmetrical, bright green, often very glossy, 8–15 cm. long, 1.5–3.5 cm. wide, scabrous on the margins, otherwise glabrous; panicles pyramidal, 15–25 cm. long, the few branches stiffly ascending or spreading, few-flowered, the lower ones often 10–12 cm. long; spikelets 4–5 mm. long, obliquely placed on short appressed pedicels.

Lasiacis sorghoidea (Desv.) Hitchc. & Chase, Contr. U. S. Nat. Herb. 18: 338. 1917. *Panicum lanatum* Swartz, Prodr. Veg. Ind. Occ. 24. 1788. Not *P. lanatum* Rottb., 1776. *P. sorghoideum* Desv. ex Hamilt. Prodr. Pl. Ind. Occ. 10. 1825. *P. swartzianum* Hitchc. Contr. U. S. Nat. Herb. 12: 140. 1908. *Lasiacis swartziana* Hitchc. Bot. Gaz. 51: 302. 1911.

Thickets, brushy slopes, oak forests, and pine ridges, up to 1,600 meters; Alta Verapaz; Izabal; Chiquimula; Guatemala; Sacatepéquez; Chimaltenango; Quezaltenango; San Marcos. West Indies; Mexico to Bolivia and Argentina.

Robust, with a strong central cane; culms erect or clambering, 2-7 meters high, freely branching, the main branches as much as 1 meter long, arcuate, drooping, or the branchlets fascicled on the main culm; sheaths papillose-hirsute to glabrate with a densely villous line on the collar, those of the main culm and branches shorter than the internodes, those of the branchlets longer than the internodes, often somewhat crowded; ligule inconspicuous; blades lanceolate, symmetrical, velvety on both surfaces or nearly glabrous above, those of the main culm as much as 20 cm. long and 3 cm. wide, those of the branches mostly 8-15 cm. long, 1-3 cm. wide, and those of the ultimate branches frequently much smaller; panicles of the main branches 10-20 cm. long, open and comparatively loosely many-flowered, the panicles of the fascicled and ultimate branches usually much reduced; spikelets 3.5-5 mm. long.

LEERSIA Swartz

Spikelets 1-flowered, disarticulating below the glumes, laterally compressed; glumes wanting; lemma awnless, chartaceous, oblong, usually 5-nerved, the lateral nerves close to the margins, these and the keel often hispid-ciliate; palea as long as the lemma, 3-nerved, the lateral nerves near the margins, usually hispid-ciliate, the margins firmly held by the margins of the lemma; stamens 1-6.

Semi-aquatic grasses, with flat, usually rough blades and open panicles.

Species about 10, in temperate and tropical regions.

Panicles 15-40 cm. long, the slender branches spreading, as much as 15 cm. long, spikelet bearing only toward the ends; spikelets 2-2.5 mm. long.

L. distichophylla.

Panicles 4-15 cm. long, the branches narrowly ascending, 1-4 cm. long, spikelet bearing nearly to the base; spikelets 3 mm. long. *L. hexandra*.

Leersia distichophylla Bal. & Poit. Bull. Soc. Hist. Nat. Toul. 12: 221. *t. 1, f. 2*. 1878. *Oryza monandra* var. *grandiflora* Doell in Mart. Fl. Bras. 2, pt. 2: 9. 1871. *Homalocenchrus grandiflorus* Hitchc. Contr. U. S. Nat. Herb. 17: 273. 1913. *Leersia grandiflora* Prodoehl, Bot. Archiv. Mez 1: 219. 1922.

Slopes along waterfall, above Río Hondo, Dept. Zacapa, about 400 meters, *Steyermark* 29443. Mexico to Panama; Guadeloupe

and Martinique; Colombia and Venezuela; Brazil, Paraguay, and northern Argentina.

Perennial; culms relatively slender, erect, 1–2 meters high, glabrous or sparsely hispid below the nodes, the nodes densely retrorsely bearded; sheaths usually longer than the internodes, keeled toward the summit, auriculate, retrorsely papillose-hispid, sometimes sparsely so; ligule 1–2 mm. long, truncate-erose, fused with the auricles of the sheath; blades flat, 15–30 cm. long, 1–1.5 cm., rarely as much as 2 cm., wide, scabrous, sometimes sparsely appressed-hispid; panicles 15–40 cm. long, open, the relatively few distant widely ascending slender branches as much as 15 cm. long, spikelet bearing only toward the ends; spikelets 2–2.5 mm. long, sparsely hispid-scabrous on the nerves, otherwise nearly glabrous; stamens 2.



FIG. 58. *Leersia hexandra*, $\times 1$.

Leersia hexandra Swartz, Prodr. Veg. Ind. Occ. 21. 1788. *L. mexicana* H.B.K. Nov. Gen. & Sp. 1: 195. 1816. *Oryza hexandra* Doell in Mart. Fl. Bras. 2, pt. 2: 10. 1871. *Leersia gouinii* Fourn. Mex. Pl. 2: 2. 1886. *Homalocenchrus hexandrus* Kuntze, Rev. Gen. Pl. 2: 777. 1891. Figure 58.

Swamps and margins of lakes and streams, up to 1,500 meters; Petén; Izabal; Jalapa; Jutiapa; Santa Rosa; Guatemala; Huehuetenango. Southeastern United States; West Indies; Mexico to Argentina; tropics of both hemispheres.

Aquatic perennial; culms slender, erect from a decumbent or creeping base, rooting at the lower nodes, 0.5 to more than 1 meter long, the nodes retrorsely hirsute; sheaths shorter than the internodes, keeled, glabrous, auriculate, the auricles acuminate; ligule 1–3 mm. long, truncate, fused with the auricles; blades 4–20 cm. long, 4–12 mm. wide, scabrous; panicles 4–15 cm. long, narrow, the short branches 1–4 cm. long, narrowly ascending, floriferous nearly to the base; spikelets 3 mm. long, hispid, strongly hispid-ciliate on the keels of the lemma and palea; stamens 2.

LEPTOCHLOA Beauv.

Spikelets few to several-flowered, the upper floret reduced to a small awnless rudiment, sessile or short-pedicel, crowded or somewhat distant on one side of the slender rachis; glumes 1-nerved, the second usually longer and broader than the first; lemmas 3-nerved, acute, minutely bifid, awnless or rarely short awned, pubescent or pilose on the margins and sometimes on the internerves.

Annual or perennial grasses with flat blades and numerous slender spikes scattered along the common axis.

Species about 20, in tropical and subtropical regions of both hemispheres.

Plants annual.

Sheaths sparsely pilose, rarely glabrous; lemmas 1–1.5 mm. long. *L. filiformis*.

Sheaths glabrous or scabrous; lemmas 2–4 mm. long.

Lemmas very abruptly obtuse or subacute, the margins nearly parallel; blades 1–4 mm. wide. *L. uninervia*.

Lemmas gradually narrowed toward the summit; blades, at least some of them, more than 4 mm. wide.

Spikes curved or flexuous; lemmas 2 mm. long. *L. scabra*.

Spikes straight; lemmas 2.5–3 mm. long. *L. panicoides*.

Plants perennial. Lemmas awnless, or rarely short awned. *L. virgata*.

Leptochloa filiformis (Lam.) Beauv. Ess. Agrost. 71, 161, 166. 1812. *Festuca filiformis* Lam. Tabl. Encycl. 1: 191. 1791. *Eleusine mucronata* Michx. Fl. Bor. Amer. 1: 65. 1803. *Leptochloa mucronata* Kunth, Rév. Gram. 1: 91. 1829. *L. paniculata* Fourn. Bull. Soc. Bot. France II. 27: 296. 1880. Figure 59.

Sand bars, fields, and waste places at low altitudes; Petén; Izabal. Southeastern United States to Argentina.

Annual; culms slender to rather coarse, branching, erect or sometimes geniculate at the lower nodes, 10 cm. to more than 1 meter high; sheaths sparsely



FIG. 59. *Leptochloa filiformis*. Plant, $\times \frac{1}{2}$; spikelet and floret, $\times 10$.

papillose-pilose with long hairs, rarely glabrous; ligule membranaceous, 1-2 mm. long; blades 5-30 cm. long, 3-10 mm. wide, flat, lax, glabrous or sparsely papillose-pilose; inflorescence nearly half the length of the culm; spikes several to numerous, racemose on an elongated axis, spreading or reflexed, 2-15 cm. long (usually less than 10 cm.); spikelets 2-3-flowered, 1.5-2 mm. long, the upper floret scarcely exceeding the glumes; glumes acuminate, subequal; lemmas 1-1.5 mm. long, obtuse, minutely bilobed, awnless, pubescent on the nerves and sometimes on the internerves.

Leptochloa panicoides (Presl) Hitchc. Amer. Jour. Bot. 21: 137. 1934. *Megastachya panicoides* Presl, Rel. Haenk. 1: 283. 1830. *Poa panicoides* Kunth, Rév. Gram. Suppl. XXVIII. 1830. *Eragrostis panicoides* Steud. Syn. Gram. 278. 1854. *Leptochloa floribunda* Doell in Mart. Fl. Bras. 2, pt. 3: 89. 1878. *L. halei* Scribn. & Merr. Bull. U. S. Dept. Agr. Agrost. 24: 27. 1901.

Manicaria swamp near Puerto Barrios, Dept. Izabal. South-central United States; Mexico (Sinaloa, Guerrero, Tepic, Oaxaca, and Sonora); Brazil.

Annual; culms erect, branching, glabrous, 40 cm. to more than a meter tall; sheaths glabrous or scabrous, mostly longer than the internodes; ligule membranaceous, truncate, erose, 1-2 mm. long; blades flat, acuminate, 10-25 cm. long, 3-10 mm. wide, scabrous, especially on the margins; terminal inflorescence 12-30 cm. long, mostly 4-8 cm. wide, the numerous spreading spikes rather crowded, the lowermost as much as 8 cm. long (usually about 4 cm.); spikelets scarcely crowded, pedicellate, 5-7-flowered, about 4 mm. long; glumes acute or acuminate, the first narrow, 1-nerved, 1 mm. long, the second much broader, 1-3-nerved, 2 mm. long; lemmas 2.5-3 mm. long, densely pubescent on the margins near the base, the tip minutely lobed, mucronate.

Leptochloa scabra Nees, Agrost. Bras. 435. 1829. *L. langloisii* Vasey, Bull. Torrey Club 12: 7. 1885. *L. liebmanni* Fourn. Mex. Pl. Gram. 2: 147. 1886.

Margin of swamp, valley of Río Motagua, near Santa Marta, Dept. Zacapa, *Steyrermark* 29231. Louisiana; Mexico; Nicaragua; El Salvador; Costa Rica; West Indies; Colombia and Venezuela to Peru and Brazil.

Annual; culms stout, erect, branching, usually more than a meter tall; sheaths glabrous or scaberulous, rounded on the back, usually shorter but sometimes longer than the internodes; ligule ciliate, 1-2 mm. long; blades flat, lax, 10-45 cm. long, 6-14 mm. wide, scabrous; inflorescence 20-35 cm. long; spikes numerous, crowded, flexuous, spreading, the lower mostly 6-8 cm. long, the upper one somewhat shorter; spikelets 3-4-flowered, 3-4 mm. long; glumes acute or acuminate, 1-nerved, the first 1 mm. long, the second 1.5 mm. long; lemmas 2 mm. long, acute or minutely lobed, mucronate, pilose on the lower half of the midnerve and margins.

Leptochloa uninervia (Presl) Hitchc. & Chase, Contr. U.S. Nat. Herb. 18: 383. 1917. *Megastachya uninervia* Presl, Rel. Haenk. 1: 283. 1830. *Poa uninervia* Kunth, Rév. Gram. 1: Suppl. XXVIII. 1830. *Eragrostis uninervia* Steud. Syn. Pl. Glum. 1: 278. 1854. *Leptochloa imbricata* Thurber in S. Wats. Bot. Calif. 2: 293. 1880. *Diplachne uninervia* Parodi, Univ. Nac. Buenos Aires Rev. Céntr. Estud. 18: 147. 1925.

Swamps and ditches, British Honduras (Belize District). South-western United States; Mexico; West Indies; Venezuela to Peru, Brazil, and Argentina.

Annual; culms erect, simple or sparingly branched, 30–100 cm. tall, glabrous; sheaths rounded on the back, glabrous or scabrous, shorter than the internodes; ligule membranaceous, 2–3 mm. long; blades firm, flat or loosely involute, attenuate, scabrous, 10–45 cm. long, 1–4 mm. wide; panicle 10–30 cm. long; spikes numerous, approximate, stiffly ascending, the lower ones 4–9 cm. long, the upper ones gradually shorter and closer together; spikelets lead-colored, 6–9-flowered, 5–7 mm. long, appressed; first glume narrow, acute, 1–1.5 mm. long, the second much broader, abruptly acute or obtuse, mucronate; lemmas 2–3 mm. long, scarcely narrowed toward the tip, abruptly subacute or obtuse, minutely lobed, apiculate, the lateral nerves more or less excurrent, the margins pilose near the base.

Leptochloa virgata (L.) Beauv. Ess. Agrost. 71, 161, 166. 1812. *Cynosurus virgatus* L. Syst. Nat. ed. 10. 2: 876. 1759. *Festuca virgata* Lam. Tabl. Encycl. 1: 189. 1791. *Eleusine virgata* Pers. Syn. Pl. 1: 87. 1805. *Chloris digitaria* H.B.K. Nov. Gen. & Sp. 1: 168. 1816. *Leptostachya virgata* G. Meyer, Prim. Fl. Esseq. 74. 1818. *Cynodon virgatus* Raspail, Ann. Sci. Nat. Bot. 5: 302. 1825. *Leptochloa perennis* Hack. Inf. Est. Centr. Agron. Cuba 1: 411. 1906.

Open banks, swamps, pine ridges, and roadsides, often a weed in cultivated ground and waste places at low altitudes; Petén; Izabal; Escuintla. British Honduras; Texas and Florida; West Indies; Mexico to Argentina.

Perennial; culms tufted, erect or somewhat decumbent at the base, 30 cm. to more than 1 meter high; sheaths rounded, glabrous or nearly so; ligule 0.2–0.3 mm. long, minutely erose; blades 10–20 cm. long, 4–12 mm. wide, flat, acuminate, the margins scabrous; inflorescence drooping, 10–15 cm. long; spikes somewhat aggregate, slender, drooping, mostly 6–10 cm. long; spikelets 3–4-flowered, 2–3 mm. long; glumes similar, acute, the first 1.5 mm. long, the second a little longer; lemmas 1.5–2 mm. long, sparsely pilose on the margins, the tip blunt, often minutely lobed, awnless or rarely short-awned.

LEPTOCORYPHIUM Nees

Spikelets lanceolate, paniculate; first glume wanting, second glume and sterile lemma subequal, longer than the fruit, the glume 3-nerved, the lemma

5-nerved, both covered with white silky hairs; fruit reddish brown with a thin hyaline tip, scarcely indurate, the margins of the lemma not inrolled, the palea free at the summit.

Densely tufted perennials with long narrow blades and small, narrow, somewhat silky panicles.

Species one or two, in tropical America.

Leptocoryphium lanatum (H.B.K.) Nees, Agrost. Bras. 84. 1829. *Paspalum lanatum* H.B.K. Nov. Gen. & Sp. 1: 94. pl. 29. 1816. *Milium lanatum* Roem. & Schult. Syst. Veg. 2: 322. 1817. *Anthaenantia lanata* Benth. Jour. Linn. Soc. Bot. 19: 39. 1881. Figure 60.

Open grassy plains and pine woods at low altitudes; Petén; Alta Verapaz; Izabal. British Honduras; West Indies; southern Mexico to Argentina.

Perennial; culms 50–100 cm. high in small dense tufts; leaves somewhat crowded toward the base, the blades elongate, flat or folded, sometimes involute, 2–4 mm. wide, scabrous; panicles 6–17 cm. long, narrow but loose, the branches narrowly ascending or rarely spreading; spikelets 4 mm. long, densely pilose with pale, silky, appressed or spreading hairs.

One of the dominant grasses of the savannahs of central Petén.

LITHACHNE Beauv.

Plants monoecious; panicles small, the terminal staminate or wanting, the axillary composed of one pistillate spikelet and several staminate spikelets below it; pistillate spikelet: first glume wanting; second glume and sterile lemma nearly equal, acuminate, 5–7-nerved; fruit laterally flattened, bony-indurate, white, smooth and shining, the lemma gibbous, the margins tightly enclosing the convex palea; staminate spikelets reduced to the lemma and palea.

Wiry perennials with broad asymmetrical blades and small terminal and axillary panicles.

Species 2, tropical America.

Lithachne pauciflora (Swartz) Beauv. ex Poir. Dict. Sci. Nat. 27: 60. 1823. *Olyra pauciflora* Swartz, Prodr. Veg. Ind. Occ. 21. 1788. *O. axillaris* Lam. Encycl. 4: 547. 1797. *Lithachne axillaris* Beauv. Ess. Agrost. 166. pl. 24, f. 2. 1812. Figure 61.

Damp forests, up to 1,400 meters; Petén; Alta Verapaz; Izabal; Quezaltenango. British Honduras; West Indies; eastern Mexico to Ecuador, Brazil, and northern Argentina.



FIG. 60. *Leptocoryphium lanatum*. Plant, $\times \frac{1}{2}$; floret, $\times 10$.



FIG. 61. *Lithachne pauciflora*. Plant, $\times \frac{1}{2}$; glumes and floret of pistillate spikelet, $\times 5$.

Slender erect perennial; culms tufted, woody, 25–50 cm. high, more or less geniculate at the lower nodes; sheaths, except the uppermost, shorter than the internodes, glabrous or minutely pubescent, sometimes ciliate on the margin, the lower ones bladeless; ligule ciliate, about 1 mm. long; blades asymmetrical, acuminate, 5–8 cm. long, 1.5–2.5 cm. wide, glabrous, the margins scabrous; staminate spikelets 4–6 mm. long, acuminate; pistillate spikelets about 10 mm. long, the second glume a little longer than the sterile lemma; fruit 4–5 mm. long, triangular-gibbous, smooth and shining, white, or sometimes mottled brown.

LOLIUM L.

Spikelets several-flowered, placed edgewise, alternate, on opposite sides of the continuous rachis; first glume wanting; lemmas rounded on the back, obtuse, awned or awnless.

Annuals or perennials with flat blades and usually long slender spikes.

Species about 8, in Europe and Asia. A few are introduced in America, some being valuable as forage grasses in cool or temperate regions.

Glume about half as long as the spikelet; lemmas awnless *L. perenne*.

Glume nearly as long as the spikelet; lemmas long-awned *L. temulentum*.

Lolium perenne L. Sp. Pl. 83. 1753.

Meadows at upper altitudes; Jalapa; Quezaltenango. Introduced from Europe; cultivated for forage in cool moist climates.

Culms erect or geniculate ascending, mostly 20–50 cm. tall, glabrous; sheaths glabrous, shorter than the internodes, the auricles small or wanting; blades lax, smooth and shining on the lower surface, 6–15 cm. long, 2–4 mm. wide; spike 8–15 cm. long, sometimes longer, erect or somewhat drooping; spikelets 8–14 mm. long, about as long as or somewhat longer than the internode of the rachis; glume usually about half as long as the spikelet, obtuse; first lemma 6–7 mm. long, obtuse or acutish, awnless, or rarely with a short awn.

Lolium temulentum L. Sp. Pl. 83. 1753.

A weed in flax, wheat, and corn fields at upper altitudes; Jalapa; Chimaltenango; Quezaltenango. Introduced from Europe.

Annual; culms erect, commonly 40–90 cm. high; sheaths mostly longer than the internodes, smooth or scaberrulous, with rather prominent auricles; blades 3–6 mm. wide, scabrous; spikes erect, stiff, as much as 25 cm. long; spikelets 5–7-flowered, the glume obtuse, 1.5–2.5 cm. long, as long as or somewhat exceeding the florets; florets plump, the lemmas 6–8 mm. long, obtuse, the awn 6–12 mm. long.

LUZIOLO Juss.

Monococious, the staminate and pistillate spikelets in separate inflorescences, the staminate usually terminal, the pistillate from the middle and upper nodes;

glumes wanting; lemma and palea nearly equal, thin, several- to many-nerved, the nerves more prominent in the pistillate spikelets; stamens several; stigmas long, plumose; caryopsis free, subspherical, smooth or minutely striate.

Aquatic or semiaquatic perennials.

Species about 7 or 8, in tropical and subtropical America.

Luziola peruviana Gmel. Syst. Nat. ed. 10. 2: 1269. 1759.
Figure 62.

Marshes and wet meadows, up to 1,600 meters; Alta Verapaz; Jalapa; Jutiapa. Southern Mexico; Honduras; Cuba; Colombia to Bolivia, Brazil, and northern Argentina.

Perennial; culms soft, decumbent-spreading and rooting at the nodes; sheaths somewhat inflated, glabrous, at least the lower ones overlapping; ligule hyaline, about 5 mm. long; blades linear, 8–15 cm. long, 2–3 mm. wide, the margins scabrous; staminate panicles exserted, 5–7 cm. long, the branches ascending or spreading, the spikelets 5–7 mm. long; pistillate panicles 1–7 cm. long, usually partly enclosed in the sheath, the spikelets 2 mm. long, acuminate, pale or purple.

MANISURIS L.

Spikelets in pairs at the nodes of a thickened, readily disarticulating rachis, one sessile and perfect, the other pedicellate and sterile, the sessile spikelet appressed to the rachis forming a subcylindrical raceme; first glume of sessile spikelet indurate, obtuse, winged, smooth or variously wrinkled or pitted; sterile lemma, fertile lemma, and palea hyaline, the fertile lemma awnless; pedicellate spikelet smaller and less indurate than the sessile, sterile.

Slender perennials with narrow flat blades and solitary subcylindrical racemes.

Species probably about 25, in warmer parts of both hemispheres.

Manisuris ramosa (Fourn.) Hitchc. Proc. Biol. Soc. Washington 40: 88. 1927. *Rottboellia ramosa* Benth. ex Hemsl. Biol. Centr. Amer. Bot. 3: 521. 1885. Not *R. ramosa* Cav., 1801. *Apogonia ramosa* Fourn. Mex. Pl. 2: 63. 1886. *Rottboellia aurita stigmosa* Hack. in DC. Monogr. Phan. 6: 311. 1889. *Coelorachis ramosa* Nash, N. Amer. Fl. 17: 86. 1909.

Ditch along railroad near Cristina, Izabal, *Blake* 7586. Southern Mexico; Honduras; Panama; Colombia.

Perennial; culms tufted, erect, about 1 meter high, branching from the middle and upper nodes; sheaths compressed, keeled, glabrous, the lower ones longer, the upper ones shorter than the internodes; blades elongate, conduplicate toward the base, becoming flat toward the tip, 3–6 mm. wide, glabrous; racemes mostly 6–9 cm. long, partly enclosed or usually exserted on long peduncles from narrow inconspicuous spathes; pedicel of secondary spikelet often winged toward the summit; sessile spikelet 4–5 mm. long, the first glume indurate, rather prominently pitted in lines, broadly winged, bilobed, the lobes obtuse; pedicellate spikelet usually much reduced.



FIG. 62. *Luziola peruviana*. Plant, $\times \frac{1}{2}$; pistillate and staminate spikelets, $\times 5$.

MELINIS Beauv.

Spikelets with one perfect floret and a sterile lemma below; first glume very small; second glume and sterile lemma about equal, lobed, the glume mucronate, the lemma bearing a long slender awn from between the lobes; fertile floret somewhat cartilaginous, shorter than the sterile lemma, awnless.

Species about 15, in Africa; one introduced in America.



FIG. 63. *Melinis minutiflora*. Plant, $\times 1$; spikelet, $\times 10$.

Melinis minutiflora Beauv. Ess. Agrost. 54. pl. 11, f. 4. 1812.
Panicum minutiflorum Raspail, Ann. Sci. Nat. Bot. 5: 299. 1825.
P. melinis Trin. Mém. Acad. St. Pétersb. VI. Sci. Nat. 1: 291. 1834.
Calinguera (Sacatepéquez); *Zacate gordura*; *pasto de gordura*; *molasses grass*. Figure 63.

Pastures and brushy slopes, about 1,500 meters; Alta Verapaz; Sacatepéquez. Native of Africa, introduced for forage. Becoming widespread in Central and South America and the West Indies.

Annual; culms freely branching, erect from a decumbent base, rooting at the lower nodes, usually more than 1 meter long; lower sheaths much longer than the internodes, densely and rather softly papillose-pilose; blades mostly 10–20 cm. long, 5–10 mm. wide, pilose or papillose-pilose; panicles 10–25 cm. long, rather dense, purple, the numerous slender branches narrowly ascending or sometimes spreading; spikelets about 2 mm. long, the slender awn as much as 1 cm. long.

The pubescence is usually very viscid, so that the plants are sticky and produce a strong sweetish odor.

MELOCANNA Trin.

Unarmed bamboos growing in more or less open clumps, spreading by tardily determinate rhizomes provided (at least in the type species) with a long, budless neck, giving an open, dumetose clump habit; culms erect or suberect, nodding to broadly arched at the tip; culm sheaths tardily deciduous; branches numerous, slender, subequal; leaves without typically tessellate venation, but often with visible ridges connecting the tertiary veins. Inflorescences spicate, terminating leafy or leafless branches; spikelets few-several-flowered, the lemmas preceded by several bracts, the upper bracts gemmiparous; palea not keeled; lodicules 2; stamens 6 (5–7), the filaments free or irregularly connate; ovary glabrous, the style elongate, slender, crowned by 2–4 hairy stigmas. Fruit (known only in the type species) large, pear-shaped, beaked, with a thick, fleshy pericarp.

The genus is here defined on the basis of the type species only, the other species ascribed to it being imperfectly known and of uncertain affinity.

One species has been introduced in Guatemala.

Melocanna baccifera (Roxb.) Kurz, Prelim. Rep. For. Veg. Pegu, Appendix B: 94. 1875. *Bambusa baccifera* Roxb. Pl. Coromandel 3: 37. *pl.* 243. 1819. *Melocanna bambusoides* Trin. in Spreng. Neue Entd. 2: 43. 1821. Figure 64.

A bamboo of India and Burma, where it often occurs in vast natural groves. It is one of the most versatile bamboos in the area of its nativity, being much used for building purposes and woven ware, and as a source of paper pulp. The species was introduced to the Western Hemisphere at the old Castleton Gardens, Jamaica, about 45 years ago, through the agency of the Officer in Charge of the Botanical Department of the Jamaican Government at that time. In 1948, through the kindness of Mr. E. J. Downes, then in charge of the Botanic Gardens of the island, the Instituto Agro-



FIG. 64. *Melocanna baccifera* (Roxb.) Kurz. 1, leaf-branch with flowers showing stigmas, $\times \frac{1}{2}$; 2, part of flower-panicle, $\times \frac{1}{2}$; 3, culm-sheath, reduced; 4, spikelet, enlarged; 5, spikelet, opened to show lodicules, stamens, and stigmas, enlarged; 6, lodicule, enlarged; 7, stamen, enlarged; 8 and 9, caryopsis, reduced. From J. S. Gamble, *Bambuseae of British India*, Calcutta Botanic Gardens, *Annals* 7: pl. 105. 1907.

pecuario Nacional was able to secure propagating material for trial in Guatemala, this having been established successfully at Chocotá, Suchitepéquez. The species later (in 1951) flowered and fruited in Oahu, Hawaiian Islands, and with the aid of Mr. Max F. Landgraf and Professor Marie C. Neal, viable fruits were shipped to Guatemala and successfully propagated there. Suchitepéquez; Alta Verapaz. India (whence the type); Burma.

Clumps open, dumetose; culms exceeding 20 meters in height and reaching a diameter of 7.5 cm., erect or suberect, with a broadly arched, slender tip; internodes thick-walled at the base of the culm, rather thin above, cylindrical, smooth, glabrous, lightly or not at all pruinose; nodes not at all inflated, the sheath scar thin, glabrous, the nodes in the lower half or more of the culm without buds in plants of mature stature; culm sheaths somewhat persistent, very brittle, glabrous on the back and margins; auricles and oral setae lacking; ligule very short, delicate, extending in a narrow band across the broad, concave apex of the sheath proper, fimbriate on the margin with fragile, fugacious bristles; sheath blade deciduous, long, narrow, canaliculate, tapering gradually toward the smooth, subulate tip, appressed, glabrous or nearly so on both surfaces. Branches numerous, slender, subequal. Leaf sheaths striate with salient veins, glabrous on the back, ciliolate on one margin; auricles lacking; oral setae numerous, up to 20 mm. long, slender, glabrous, pale, straight or slightly wavy, appressed, persistent; petiole elongate, glabrous on both surfaces; leaf blade up to 35 cm. long and 75 mm. wide, usually much smaller, lanceolate or oblong-lanceolate, narrowed above into a slender, scabrous, penicillate, hairy, twisted tip, scabrous along one margin and glabrous elsewhere on the upper surface, more or less noticeably paler and usually puberulent on the lower surface when young, more or less completely glaucescent at length, lightly cartilaginous and finely serrulate on both margins, midrib and secondary veins salient on the lower surface, the secondary veins not distinguishable from the tertiary ones on the upper surface, the tertiary veinlets in some leaves irregularly connected on the lower surface by visible transverse ridges.

MEROSTACHYS Spreng.

Unarmed, caespitose bamboos, spreading by thick, determinate rhizomes; culms erect, ascending, broadly arched or scandent above; internodes cylindrical, usually not at all flattened above the point of insertion of the branches, thin-walled; nodes usually not at all inflated, the sheath scar often thickened by a persistent callus; culm sheaths deciduous, the blade usually slender, much narrower than the truncate apex of the sheath proper and strongly reflexed, often fugacious; branches slender, fascicled, subequal; leaf blades often with transverse veinlets or ridges visible between the tertiary veins on the lower surface. Inflorescences spicate, usually secund or apparently so; spikelets subsessile, without subtending bracts; empty glumes 2, very unequal, with usually one, rarely 2 or 3 perfect florets and a terminal rudiment borne on a slender, stiff, elongate rachilla segment; palea narrowly sulcate when addorsed to the terminal rudiment, more broadly and shallowly so when addorsed to a perfect floret; lodicules 3; stamens typically 3; ovary often triquetrous, the style slender, relatively short, thickened or not at the base, styles 2, plumose. Fruit a typical caryopsis.

About 20 species have been described, principally from Brazil, with one each in Paraguay, Peru, British Honduras, and Guatemala. The one from British Honduras is included here.

FIELD KEY

Leaf blades ovate-lanceolate to oblong-lanceolate, abruptly acuminate, up to 28 cm. long and 75 mm. wide; petiole up to 8 mm. long *M. argyronema*.

Leaf blades lanceolate, acuminate, up to 12 cm. long and 14 mm. wide; petiole up to 3 mm. long *M. pauciflora*.

Merostachys argyronema Lindm., Svensk. Vet. Akad. Handl. 34 (6): 22. *pl.* XV. 1900. *Flauta*.

A species of the cloud forest at elevations above 1,500 meters. The culms are used at Purlhá and elsewhere to make flutes, resonance tubes for marimbas, and basketry. Baja Verapaz; Huehuetenango; El Progreso. Brazil (whence the type).

Culms to 10 or 12 meters tall and 5 cm. in diameter, erect or suberect, broadly arched and clambering above; internodes elongate (to about 1 meter long), thin-walled, green, finely figured with greenish-yellow or wine-colored splotches, sparsely strewn with retrorse, papillose, fugacious setae, antrorsely canescent-hirsute below the nodes; nodes scarcely inflated, the sheath scar retaining a broad coarse callus from the base of the culm sheath; culm sheaths deciduous, fragile, with distant, salient veins, retrorse-hirsute with white hairs on the back, glabrous on one margin, fringed on the other margin near the top, with long, stiff, basally scabrous bristles up to 10 mm. long (longer in the upper sheaths), auricles lacking; oral setae numerous, pale, coarse and weakly scabrous at the base, about 10 mm. long, fine and recurved at the tip; ligule very short (scarcely 2 mm. high), concave, densely ciliolate on the margin; sheath blade fugacious, linear-lanceolate, strongly reflexed, prominently striate with coarse, salient nerves on both surfaces, antrorse-hispid on the inner (adaxial) surface, sparsely villous on the outer (abaxial) surface, serrulate on both margins. Branches at each node numerous, coarse, relatively short. Leaf sheaths striate with salient nerves, retrorse-hispid on the back, glabrous on one margin, fringed near the apex on the other margin with several basally dark, coarse and weakly asperous bristles, up to 10 mm. long, pale, glabrous, and tapered above to a fine, crisped-recurved point; auricles lacking; oral setae numerous, in one row, similar to the marginal bristles but several and longer (to 15 mm.); petiole up to 8 mm. long, dark, slender, asperous or glabrous on the upper surface, glabrous on the lower surface; leaf blade up to 28 cm. \times 75 mm., commonly much smaller, ovate-lanceolate to oblong-lanceolate, asymmetrically rounded to cuneate at the base, gradually tapered upward, abruptly acuminate near the tip, scabrous near the outer margin and sometimes hispid near the base on the upper surface, glabrous or nearly so and, excepting a narrow zone along the outer margin, distinctly paler on the lower surface, spinulose on the margins; midrib and secondary veins weakly salient on the lower surface, with a few obliquely transverse ridges visible here and there between the tertiary ones.

Known in Guatemala only by sterile specimens. The following details of the reproductive parts are supplied from Lindman's original description (op. cit., p. 23):

Inflorescences simple, falcate, second spikes, terminal to leafy twigs, emerging not quite completely from the uppermost leaf sheath, the rachis strigose, with



FIG. 65. *Merostachys pauciflora*. Inflorescence, $\times 1$; florets, $\times 2\frac{1}{2}$. Amer. Mid. Nat. 29: 469. f. 1. 1943.

very short hairs. Spikelets 11 mm. long, narrowly fusiform, a little incurved, acute when closed, sessile, or the pedicel with rudimentary glumes reduced to a very short, hispid callus. Sterile lemmas 2, purplish, glabrous, the lower one facing the base of the inflorescence and about one-fourth as long as the spikelets, recurved, lanceolate-subulate, the midnerve scabrous, the upper sterile lemma lanceolate, apiculate, half as long as the spikelet, 5-nerved. Perfect floret one, sitting on a rachilla segment 2 mm. long; fertile glume (lemma) oblong-lanceolate, sparsely pubescent, green-spotted on the inside, 11-nerved; the palea a little narrower but a little longer (than the lemma), incurved, 5-nerved, green-spotted in the same way as the lemma, ciliolate at the apex, the dorsal keels minutely ciliolate. Anthers linear, 6 mm. long. Pistil 5 mm. long, the ovary subcylindrical, the stigmas long, weakly long-fringed. Mature fruit unknown.

Merostachys pauciflora Swallen, Amer. Mid. Nat. 29: 469. f. 1. 1943. Figure 65.

Known only from the type collection from the bank of Big Eddy Creek, Stann Creek District, British Honduras, *Gentle* 3485.

Culms tall, slender, hollow, as much as 3.5 cm. thick at the base, retrorsely scabrous and sometimes appressed hirsute, especially above the nodes; leafy branches very slender, smooth, numerous in dense whorls from just above the nodes, as much as 40 cm. long, with short leafless flowering branches intermixed, the leafy branches often bearing inflorescences, these whorls, then, usually without shorter leafless flowering branches; lower internodes of the branches short, the middle ones elongate with short leafless sheaths, the several upper ones again short with overlapping leaf-bearing sheaths; sheaths glabrous, fimbriate at the mouth; blades rather thin, shiny, lanceolate, acuminate, 7–12 cm. long, 8–14 mm. wide, rounded and narrowed at the base to a short petiole 2–3 mm. long; inflorescence a simple raceme, the 3-sided densely pubescent axis bearing 3–8 spikelets or sometimes reduced to a single spikelet; spikelets inflated, 10–12 mm. long, solitary, distant, alternate on two sides of the rachis, ascending to finally reflexed, the densely pubescent pedicels about 2 mm. long; glumes subequal, glabrous, 7-nerved, a little shorter than the spikelet, the first broadly lanceolate, acute, the second oblong, abruptly narrowed at the somewhat saccate tip to a short point, the margins ciliate toward the summit; lemma about as long as the second glume and similar to it in shape, firm, smooth and shining, about 15-nerved, the nerves obscure; palea a little longer than the lemma, similar in texture, the keels close together, enclosing between them the prolonged rachilla; rachilla villous in the upper half, the hairs protruding from between the keels of the palea. (Swallen, loc. cit.)

MESOSETUM Steud.

Spikelets sessile or very shortly pedicellate, in two rows on one side of the flattened rachis, the first glume turned toward the rachis, hence the back of the fruit turned away from the rachis; first glume more than two-thirds as long as the spikelet, 3–5-nerved; second glume and sterile lemma equal, exceeding the fruit; fertile lemma acute, minutely striate or roughened, the margins flat, but tightly enclosing the palea.

Perennial grasses (in our species) with narrow blades and solitary, one-sided, spikelike racemes.

Plants stoloniferous *M. stoloniferum*.

Plants caespitose, without stolons.

Blades flat, prominently hispid on both surfaces; sterile lemma with a well-developed palea *M. blakei*.

Blades involute, glabrous or nearly so; sterile lemma without a palea.
M. filifolium.

Mesosetum blakei Swallen, Brittonia 2: 390. 1937.

Known only from the type, collected on open grassy plain, at Cristina, Izabal, *Blake* 7657.

Perennial; culms densely tufted, as much as 55 cm. tall, glabrous, the nodes upwardly bearded; sheaths papillose-pilose, the uppermost bladeless or nearly so; blades flat or involute-pointed, firm, 8-12 cm. long, 2-3 mm. wide, densely pilose or papillose-pilose; raceme erect, 6-8 cm. long, silvery; spikelets 5 mm. long, appressed; first glume 3.5-4 mm. long, acute, densely pilose across the lower part of the back, the margins densely hispid on the lower half; second glume 4-5 mm. long, acute or subacuminate, the margins papillose-hispid just above the middle; sterile lemma equaling the second glume, the margins and lateral nerves evenly papillose-hispid from the base nearly to the apex, the palea well developed; fruit 4 mm. long, acute, minutely striate.

Mesosetum filifolium F. T. Hubb. Proc. Amer. Acad. 49: 494. 1913. *Peniculus angustifolius* Swallen, Amer. Jour. Bot. 19: 581. fig. 1. 1932. *M. angustifolium* Swallen, Jour. Washington Acad. Sci. 23: 460. 1933.

Pine ridges, British Honduras. Type from Manatee Lagoon, Peck 136.

Perennial; culms densely tufted, slender, erect, 25-45 cm. tall, the nodes pubescent; blades firm, involute, 5-9 cm. long, the uppermost much reduced, those of the innovations elongate; raceme 2-6 cm. long, the rachis more or less flexuous; spikelets distant, 5 mm. long; first glume 4.5 mm. long, tuberculate-ciliate on the lower half; second glume and sterile lemma equal, acute, tuberculate-ciliate in the upper half; fruit 4.5 mm. long, firm, acute, glabrous.

Mesosetum stoloniferum Swallen, Contr. U. S. Nat. Herb. 29: 412. 1950. Figure 66.

Known only from the type, collected on dry rocky slopes, Montaña Castilla, 3 miles south of Quezaltepeque, Chiquimula, *Steyermark* 31266.

Stoloniferous perennial; culms erect, 26-47 cm. high, glabrous, more or less bearded at the nodes; sheaths longer or somewhat shorter than the internodes, glabrous, more or less ciliate toward the summit; ligule densely ciliate, 0.5 mm. long; blades 8-15 cm. long, 3-4 mm. wide, flat, firm, glabrous, the margins thickened, whitish, scabrous, sparsely hispid ciliate; stolons as much as 1 meter long, purple, the internodes mostly 2.5-4 cm. long, the nodes bearded, the sheaths about half as long as the internodes, papillose-pilose, the margins densely ciliate, the blades reduced; raceme 3.5-7.5 cm. long, the rachis narrowly winged, the margins scabrous; spikelets 5 mm. long, short-pedicellate, the glumes and sterile lemma subequal; first glume 3-nerved, narrowed at the base, scabrous, abruptly pointed; second glume 5-nerved, the lateral nerves approximate, the margins densely ciliate in the lower half; sterile lemma obtuse, appressed villous on the margins nearly to the summit; fertile lemma subacuminate, with a line of long hairs on each side.

MICROCHLOA R. Br.

Spikelets 1-flowered, sessile in two rows on one side of a narrow flattened rachis, the rachilla disarticulating above the glumes; glumes subequal, longer



FIG. 66. *Mesosetum stoloniferum*. Plant, about $\times \frac{1}{2}$; spikelet, $\times 15$.

than the floret, acute, 1-nerved; floret with a soft, pointed callus; lemma thin, 3-nerved, flabellate, ciliate on the margins; palea narrow, a little shorter than the lemma, ciliate on the keels.

Densely tufted annuals or perennials with short narrow or involute blades and solitary slender arcuate spikes.

Species 5 or 6, mostly in tropical America and Africa.



FIG. 67. *Microchloa kunthii*. Plant, $\times \frac{1}{2}$; spikelet and floret, $\times 10$.

Microchloa kunthii Desv. Opusc. 75. 1831. *Paspalum tenuissimum* M. E. Jones, Contr. W. Bot. 18: 24. 1935. Figure 67.

Bare open rocks; Santa Rosa (Santa Rosa); Sacatepéquez (Magdalena). Mexico; Honduras; probably also in South America.

Perennial; culms very slender, erect in small dense tufts, 10–30 cm. high; sheaths, except the lowermost, much shorter than the internodes, scaberulous; ligule ciliate, 1–1.5 mm. long; blades firm, flat or usually folded, with thick white scabrous margins, those of the culm 1–2.5 cm. long, those of the innovations as much as 6 cm. long, 1–1.5 mm. wide; spike 6–15 cm. long, arcuate, the rachis ciliate; spikelets 2.5–3.5 mm. long; lemma 2–2.5 mm. long, pilose on the midnerve, the margins densely ciliate with hairs about 1 mm. long.

MUHLENBERGIA Schreb.

Spikelets 1-flowered, the rachilla disarticulating above the glumes; glumes very short to as long as the floret, 1-nerved, obtuse to acuminate, awnless or awned; lemma 3-nerved, usually rather firm, 3–5-nerved, mucronate or awned, with a short, usually pilose callus; palea as long as the lemma or nearly so.

Annuals or perennials with very slender to coarse culms, flat, folded, or involute blades, and narrow, dense, or diffuse panicles of small spikelets.

Species about 125, mostly American.

Plants annual; culms slender, branching, usually spreading.

Spikelets awnless.

Panicles partly enclosed in the sheath, inconspicuous. Spikelets 1.8 mm. long.....*M. vaginata*.

Panicles exserted, open.

Spikelets 2.5–2.8 mm. long.....*M. breviculmis*.

Spikelets not more than 1.8 mm. long.

Pedicels stout, at least the lateral ones shorter than the spikelets.

M. ramulosa.

Pedicels filiform, elongate, at least much longer than the spikelets.

M. confusa.

Spikelets awned.

Second glume prominently 3-toothed.....*M. pusilla*.

Second glume entire.

Glumes unlike, one of some of the spikelets of each branch long-awned.

M. diversiglumis.

Glumes of all spikelets alike.

Glumes obtuse, awnless.

Pedicels capillary, flexuous or recurved, implicate.....*M. implicata*.

Pedicels short, relatively stout, not curved or flexuous.

M. microsperma.

Glumes awned.

Lemma ciliate; panicle open, the branches spreading....*M. ciliata*.

Lemma not ciliate; panicle narrow, the branches appressed.

M. tenella.

Plants perennial.

Culms straggling, widely spreading, as much as 1 meter long. . . . *M. setarioides*.

Culms erect or decumbent at the base.

Culms not more than 25 cm. high.

Spikelets 3-3.5 mm. long, the lemma awned; culms simple. . . . *M. orophila*.

Spikelets 2 mm. long, the lemma awnless; culms with short branches from the lower nodes. . . . *M. calcicola*.

Culms more than 50 cm. high.

Lower sheaths conspicuously compressed, keeled.

Ligule prominent, decurrent, 0.5-2.0 cm. long. . . . *M. emersleyi*.

Ligule inconspicuous, not decurrent, very short or enclosed in the folded base of the blade.

Lemma awnless. . . . *M. presliana*.

Lemma awned.

Awns 1-1.7 cm. long; culms glabrous below the nodes.

Spikelets 2.5-3 mm. long; blades 1-3 mm. wide, attenuate.

M. breviligula.

Spikelets 2-2.2 mm. long; blades 4-5 mm. wide. . . . *M. aurea*.

Awns not more than 5 mm. long. . . . *M. distans*.

Lower sheaths rounded, not compressed or keeled.

Panicles narrow, very dense and spikelike.

Panicles 15-30 cm. long, about 5 mm. wide, grayish-green; spikelets 4 mm. long. . . . *M. macroura*.

Panicles 5-15 cm. long, about 1 cm. wide; spikelets 6-10 mm. long.

M. nigra.

Panicles open, not spikelike.

Second glume 3-toothed.

Glumes subequal, the second deeply toothed; awns mostly 1-1.5 mm. long. . . . *M. montana*.

Glumes unequal, the second with very shallow lobes; awns mostly 5-10 mm. long. . . . *M. quadridentata*.

Second glume entire. Panicles diffuse with capillary branches and long-pedicellate spikelets. . . . *M. capillaris*.

Muhlenbergia aurea Swallen, Contr. U. S. Nat. Herb. 29: 411. 1950.

Known only from the type, collected in thickets at base of vertical slopes along railroad, Finca Pirineos, Volcán de Santa María, Dept. of Quezaltenango, altitude 1,300-1,500 meters, *Steyermark* 33175.

Perennial; culms erect, about 75 cm. tall; sheaths conspicuously flattened and keeled, about 5 mm. wide as folded, scabrous, auriculate, with a rather definite ridge at the junction of the sheath and blade, the lower ones about 20 cm. long,

subequitant; ligule hyaline, inconspicuous, about 2 mm. long; blades about 75 cm. long, 4–5 mm. wide, conduplicate at the base, flat above, very scabrous, the margins strongly scabrous-serrate; panicle 35 cm. long, golden, dense, the slender, scabrous, flexuous branches naked in the lower half, the lower ones about 12 cm. long; spikelets 2–2.2 mm. long; glumes acuminate, subequal, scabrous on the keel, a little shorter than the floret; lemma acuminate, scabrous, sparsely pilose below, the callus rather densely bearded on the sides, the hairs about 0.5 mm. long, the awn slender, flexuous, scabrous, 13–17 mm. long.

Muhlenbergia breviculmis Swallen, Contr. U. S. Nat. Herb. 29: 408. 1950. Figure 68.

Known only from the type collection, from the top of Cerro Chermalito, Sierra de los Cuchumatanes, Dept. of Huehuetenango, altitude 3,100–3,150 meters, *Steiermark* 49905.

Annual; culms slender, erect, or decumbent at the base, mostly 8–12 cm. high, branching, glabrous; sheaths mostly shorter than the internodes, rounded, glabrous; ligule 0.8–1 mm. long; blades 6–17 mm. long, 1 mm. wide, flat, firm, strongly nerved, scaberulous; panicles usually long-exserted, mostly 1.5–2.5 cm. long, the relatively slender branches stiffly ascending, few-flowered, the lower ones 8–10 mm. long; spikelets 2.5–2.8 mm. long, appressed, lead-colored; glumes obtuse, about half as long as the spikelet; lemma acute or mucronate.

Muhlenbergia breviligula Hitchc. N. Amer. Fl. 17: 458. 1935.

Prairies, pine and pine-oak forests, 250–1,500 meters; Alta Verapaz; Chiquimula; Jalapa; Guatemala (*Hitchcock* 9063, type). Southern Mexico; Honduras.

Perennial; culms erect in small clumps, 1–1.5 meters high, glabrous; sheaths keeled, broader than the base of the blade, scabrous, usually longer than the internodes; ligule a very short membranaceous rim, or nearly obsolete; blades elongate, attenuate, 1–3 mm. wide, very scabrous; panicle 25–35 cm. long, the slender branches 10–15 cm. long, ascending, very scabrous, somewhat flexuous; spikelets 2.5–3 mm. long, the glumes equal, acute or acuminate, scabrous; lemma acute, about 2–2.5 mm. long, appressed-pilose below, the awn 1–1.5 cm. long, very slender, flexuous.

Muhlenbergia calcicola Swallen, Contr. U. S. Nat. Herb. 29: 407. 1950. Figure 69.

Dense colonies in alpine meadows, wet rocky banks, and open limestone *Juniperus* forests, 2,800–3,300 meters, Huehuetenango, the type from region of Chémal (*Standley* 81703); Totonicapán.

Perennial; culms in very dense tufts, erect from a decumbent base, 4–7 cm. tall, bearing short branches with short fascicled blades from the lower nodes; sheaths short, crowded, glabrous; ligule hyaline, truncate, decurrent, as much as 0.6 mm. long; blades thick, firm, 6–15 mm. long, 1–1.5 mm. wide, flat or the margins incurved toward the blunt tip, smooth below, more or less scabrous

above and on the margins; panicles 1–1.5 cm. long, narrow, few-flowered, the short, stiff, relatively stout branches appressed or narrowly ascending, minutely hispidulous, bearing one or two spikelets; spikelets about 2 mm. long, the glumes obtuse, a little more than half as long as the lemma, the lemma acuminate, mucronate, glabrous.

Muhlenbergia capillaris (Lam.) Trin. Gram. Unifl. 191. 1824.
Stipa capillaris Lam. Tabl. Encycl. 1: 158. 1791. *Podosaemum capillare* Desv. Nouv. Bull. Soc. Philom. 2: 188. 1810. *Trichochloa*



FIG. 68. *Muhlenbergia breviculmis*.
 Plant, $\times 2$; spikelet, $\times 10$.



FIG. 69. *Muhlenbergia calicicola*.
 Spikelet, $\times 15$.

polypogon DC. Cat. Hort. Monsp. 152. 1813. *Muhlenbergia trichodes* Steud. Syn. Gram. 177. 1854.

Open prairies, dry slopes, and hillsides in pine-oak forests, 1,500–2,000 meters; Guatemala; Quiché; Huehuetenango. Eastern United States and Mexico; West Indies.

Perennial; culms in dense clumps, erect, 60 cm. to more than 1 meter high, puberulent; leaves crowded toward the base, the sheaths glabrous, the blades elongate, usually involute and somewhat curved at the base, firm, scaberulous, those of the culm sometimes flat, 1–2 mm. wide; ligule 2–5 mm. long; panicle one-third to one-half as long as the culm, diffuse, with capillary, flexuous branches and long capillary pedicels; glumes acute or subacuminate, about one-third as long as the lemma; lemma 4–5 mm. long, acuminate, scaberulous, sparsely pilose at the base, the slender, often flexuous awn mostly 10–15 mm. long.

Muhlenbergia ciliata (H.B.K.) Kunth, Rév. Gram. 1: 63. 1829. *Podosaemum ciliatum* H.B.K. Nov. Gen. & Sp. 1: 128. 1815. *Trichochloa ciliata* R. & S. Syst. Veg. 2: 386. 1817. *Polypogon ciliatus* Spreng. Syst. Veg. 1: 243. 1825. *Podosaemum brachyphyllum* Nees ex Nees & Shauer, Linnaea 19: 690. 1847. *Polypogon brachyphyllus* Fourn. ex Hemsl. Biol. Centr. Amer. Bot. 3: 552. 1885.

Dry hills and open ground, 1,350–3,500 meters; Alta Verapaz; Guatemala; Zacapa; Sacatepéquez. Mexico; El Salvador; Costa Rica; Ecuador; Peru.

Annual; culms very slender, 10–30 cm. long, erect or usually spreading, freely branching; sheaths mostly much shorter than the internodes, glabrous or more or less pilose above and on the margins; blades 1–3 cm. long, as much as 2 mm. wide, spreading or reflexed, pilose on the upper surface; panicles mostly 4–10 cm. long, the rather distant branches spreading to reflexed, rather densely flowered, the branchlets and pedicels appressed; spikelets about 2 mm. long; glumes about 0.5 mm. long, rather abruptly acute, the nerve extending into a short awn; lemma strongly 5-nerved, the lateral nerves ciliate on the upper half, the awn 5–20 mm. long, straight or somewhat flexuous.

Muhlenbergia confusa (Fourn.) Swallen, Contr. U. S. Nat. Herb. 29: 207. 1947. *Milium microspermum* Lag. Gen. & Sp. Nov. 2. 1816. Not *Muhlenbergia microsperma* Kunth, 1829. *Vilfa confusa* Fourn. Mex. Pl. 2: 101. 1886. *Sporobolus confusus* Vasey, Bull. Torrey Club 15: 293. 1888. *S. microspermus* Hitchc. Jour. Washington Acad. Sci. 23: 453. 1933.

Open ground, mostly 2,000–3,500 meters; Quiché; Guatemala (Volcán de Agua). Mexico.

Annual; culms commonly 5–20 cm. high, rarely more, delicate, erect or spreading, rather sparingly branching at the lower nodes; leaves mostly crowded toward the base, the blades less than 1 mm. wide, glabrous or scabrous; ligule

membranaceous, about 2 mm. long; panicles oblong, usually more than half the length of the culm, 2–4 cm. wide, the slender branches ascending or finally spreading; spikelets 0.8–1 mm. long, the pedicels filiform, longer than the spikelets; glumes obtuse, half as long as the floret, glabrous on the back, sparsely pilose at the tip; lemma glabrous, awnless.

Muhlenbergia distans Swallen, N. Amer. Fl. 17: 461. 1935.
Huapito.

Pine forests, Sierra de las Minas, Dept. Zacapa, 1,700–2,000 meters; *Steyermark* 29773. Oaxaca, dry hills near Las Sedas, *Pringle* 5575, type.

Perennial; culms rather slender, erect, 0.5–1.2 meters high, pubescent below the nodes, scabrous below the panicle; sheaths narrow, compressed-keeled, scaberulous; ligule delicate, 4–8 mm. long, enclosed in the folded base of the blade; blades mostly basal, elongate, 1–4 mm. wide, folded at the base, flat above, rather lax, finely scabrous on the margins, the apex slender and acuminate; panicle 20–30 cm. long, the slender branches appressed or ascending, naked on the lower half, some of the lower ones as much as 10 cm. long; spikelets 3–3.5 mm. long, the glumes equal, subobtusate, scaberulous; lemma about as long as the glumes, acute, moderately villous, the awn 2–5 mm. long, somewhat curved or flexuous.

Muhlenbergia diversiglumis Trin. Mém. Acad. St. Pétersb. VI. Sci. Nat. 4 (1): 298. 1841. *M. trinii* Fourn. ex Hemsl. Biol. Centr. Amer. Bot. 3: 543. 1885.

Scrub-oak hillsides, shady ravines, and open ground, sometimes in cultivated places, 1,350–1,700 meters; Alta Verapaz; Jalapa; Jutiapa; Guatemala; Sacatepéquez. Southern Mexico to Costa Rica; Colombia and Venezuela to Peru.

Annual; culms usually very slender, erect or more commonly widely spreading, freely branching at all the nodes, as much as 50 cm. long; sheaths mostly shorter than the internodes, papillose-pilose to nearly glabrous; ligule less than 0.5 mm. long; blades 2–5 cm. long, 0.5–2 mm. wide, thin, lax, pilose on both surfaces; panicles commonly 2–5 cm. long, narrow, the short slender branches spreading or reflexed, straight or sometimes flexuous, the lower ones rather distant, bearing 2–5 spikelets, the upper ones approximate, bearing 2 spikelets; glumes about equal, broad, irregular, 0.2–0.3 mm. long, the first glume of the terminal spikelet with a scabrous awn 1–7 mm. long; lemma 3–5 mm. long, scabrous on the back, pilose at the base, tapering into a slender scabrous awn 5–15 mm. long.

Muhlenbergia emersleyi Vasey, Contr. U. S. Nat. Herb. 3: 66. 1892. *M. vaseyana* Scribn. Rep. Mo. Bot. Gard. 10: 52. 1899. *Epicampes emersleyi* Hitchc. Bull. U. S. Dept. Agr. 772: 144. 1920. *E. subpatens* Hitchc. Bull. U. S. Dept. Agr. 772: 144. 1920.

Pine-oak forests, 1,900–2,200 meters; Huehuetenango; Quezaltenango. Southwestern United States to Panama.

Perennial; culms densely tufted, erect, 0.5–1 meter high, glabrous, the lower ones elongate, compressed, keeled, all longer than the internodes; ligule 0.5–2 cm. long, decurrent; blades elongate, conduplicate at the base, 2–5 mm. wide, scabrous, especially on the margins; panicles 15–40 cm. long, dense but rather loose, erect, the narrowly ascending branches 5–10 cm. long, naked below for a short distance, or spikelet-bearing nearly to the base; spikelets 2.5–3 mm. long; glumes equal, as long as or a little shorter than the floret, acute, scabrous; lemma scabrous above, pilose across the back near the base, the awn mostly 1–2 cm. long, flexuous.

Muhlenbergia implicata (H.B.K.) Kunth, Rev. Gram. 1: 63. 1829. *Podosaemum implicatum* H.B.K. Nov. Gen. & Sp. 1: 127. 1815. *Trichochloa implicata* Roem. & Schult. Syst. Veg. 2: 385. 1817. *Agrostis implicata* Spreng. Syst. Veg. 1: 262. 1825. *Muhlenbergia erecta* Presl, Rel. Haenk. 1: 231. 1830.

Moist thickets, brushy slopes, sand bars along streams, sandy fields, and rocky hills, 1,350–1,900 meters; Alta Verapaz; Chiquimula; Jalapa; Jutiapa; Guatemala; Sacatepéquez; Chimaltenango. Mexico to Colombia and Venezuela.

Annual; culms 15–70 cm. long, erect or spreading, branching at the lower nodes, puberulent; sheaths glabrous, shorter than the internodes; ligule 2–3 mm. long; blades rather lax, as much as 10 cm. long, 2 mm. wide, pubescent on the upper surface, the margins scabrous; panicles 5–15 cm. long, loose and open, the branches spreading, the long capillary pedicels curved and implicate; spikelets 3 mm. long; glumes minute, obtuse, more or less erose; lemma narrow, scabrous on the 5 prominent nerves, the apex bifid, the teeth extending into minute awns, the awn 1–2 cm. long, straight or somewhat flexuous.

Muhlenbergia macroura (H.B.K.) Hitchc. N. Amer. Fl. 17: 468. 1935. *Crypsis macroura* H.B.K. Nov. Gen. & Sp. 1: 140. 1815. *Cinna macroura* Kunth, Rév. Gram. 1: 67. 1829. *Crypsis setifolia* Presl, Rel. Haenk. 1: 245. 1830. *Epicampes macroura* Benth. Jour. Linn. Soc. 19: 87. 1881. *Pajón*.

Plateaus, sandy thickets, open places, and along roads, 1,500–3,000 meters; Guatemala; Sacatepéquez; Totonicapán; Huehuetenango; Quezaltenango; San Marcos. Southern Mexico. Common bunch grass used for thatch (Huehuetenango).

Perennial; culms in large coarse bunches 1–1.5 meters high, strigose below the nodes; sheaths roughish, the lower ones relatively short and crowded, those of the culm elongate, usually shorter than the internodes; ligule broad, decurrent, usually obtuse, 0.5–2.0 cm. long, or those of the culm leaves elongate, as much as 4 cm. long; blades elongate, firm, scabrous, strongly nerved, narrow and loosely involute, the upper ones commonly flat, as much as 0.5 mm. wide; panicle erect, 15–35 cm. long, about 5 mm. thick, grayish green, the short branches densely flowered, appressed; spikelets about 4 mm. long, the glumes narrow, acute, scabrous; lemma a little shorter than the glumes, acute, scabrous, awnless.

Muhlenbergia microsperma (DC.) Kunth, Rév. Gram. 1: 64. 1829. *Trichochloa microsperma* DC. Cat. Hort. Monsp. 151. 1813. *Podosaemum debile* H.B.K. Nov. Gen. & Sp. 1: 128. 1815. *Muhlenbergia debilis* Kunth, Rév. Gram. 1: 63. 1829. *M. ramosissima* Vasey, Bull. Torrey Club 13: 231. 1886.

Moist banks and wet thickets, 1,500–1,680 meters; Zacapa; Guatemala; Sacatepéquez. Nevada, Arizona, and southern California; Mexico; Colombia and Venezuela to Peru.

Annual; culms slender, erect or commonly widely spreading, usually freely branching, as much as 60 cm. long; sheaths glabrous, or scabrous toward the summit, shorter than the internodes; blades 3–10 cm. long, 1–2 mm. wide, lax, scabrous, more or less pubescent or pilose above; panicles 3–15 cm. long, rather lax, the scabrous branches stiffly ascending to spreading, spikelet-bearing to the base; spikelets short-pedicellate, usually abruptly spreading; glumes obtuse, subequal, 0.5–1 mm. long; lemma 2–4 mm. long, scabrous, with a slender awn 1–3 cm. long.

Muhlenbergia montana (Nutt.) Hitchc. Bull. U. S. Dept. Agr. 772: 145, 147. 1920. *Calycodon montanum* Nutt. Jour. Acad. Phila. II. 1: 186. 1848. *Muhlenbergia trifida* Hack. Repert. Sp. Nov. 8: 518. 1910. *M. enerves* Hitchc. Contr. U. S. Nat. Herb. 17: 302. 1913.

Dry pine and oak woods, 1,800–2,100 meters; Guatemala; Quiché; Huehuetenango. Western United States; Mexico.

Perennial; culms in dense tufts, erect, 30–60 cm. high, the leaves mostly crowded toward the base, with numerous innovations; sheaths longer than the internodes, the lower ones becoming loose and flat; ligule as much as 1 cm. long; blades flat, or becoming involute, firm and scabrous, the lower ones about 10 cm. long, the upper ones much longer, 1–3 mm. wide; panicles as much as 30 cm. long, loose or rather dense, the branches appressed or narrowly ascending, floriferous from the base; glumes subequal, or the second a little longer, the first narrow, acute, the second broad, usually deeply 3-toothed; lemma about 4 mm. long, rather densely pilose below, scabrous above, tapering into a slender, scabrous, flexuous awn 1–1.5 cm. long.

Muhlenbergia nigra Hitchc. N. Amer. Fl. 17: 468. 1935. *Pajón largo* (Quezaltenango).

Exposed summits, 2,300–4,200 meters; Sacatepéquez; Quezaltenango; Huehuetenango. Southern Mexico.

Perennial; culms 0.5–1.5 meters high, in coarse dense clumps, pubescent below, scabrous at least below the panicle; sheaths scabrous to nearly glabrous, the lower ones crowded, the upper elongate; ligule firm, 1–2 cm. long; blades firm, involute, elongate, scabrous, usually curved, at least at the base, attenuate; panicles 5–15 cm. long, dense, spikelike, dark gray-green or olive, the short densely flowered branches appressed; glumes 6–10 mm. long, acuminate, narrow, scabrous,

sometimes awn-pointed; lemma a little shorter than the glumes, acute or acuminate, scabrous.

Muhlenbergia orophila Swallen, Contr. U. S. Nat. Herb. 29: 408. 1950. Figure 70.

Known only from the type, collected in alpine meadow, Cerro Chémal, summit of Sierra de los Cuchumatanes, Dept. Huehuetenango, altitude 3,700–3,800 meters, *Steyermark* 50309.

Perennial; culms very densely tufted, erect, 12–25 cm. tall; sheaths all longer than the internodes, glabrous; ligule truncate, about 0.5 mm. long; blades 6–8 cm. long, 1–1.5 mm. wide, subattenuate, glabrous, or finely scabrous toward the tip and on the margins; panicles 5–8 cm. long, partly enclosed in the sheath, the slender scabrous branches naked below, bearing a few spikelets at the ends of the branchlets; spikelets dark purple, 3–3.5 mm. long not including the awn; glumes subequal or the first a little shorter, 1.5–2 mm. long, acute; lemma glabrous, gradually tapering into the short scabrous awn, the awn 0.5–1 mm. long.

Muhlenbergia presliana Hitchc. N. Amer. Fl. 17: 462. 1935. *Epicampes stricta* Presl, Rel. Haenk. 1: 235. pl. 39. 1830. Not *M. stricta* Kunth.

Rocky hills, brushy slopes and pine forests, 1,500–2,000 meters; Guatemala; Sacatepéquez; Chimaltenango. Southern Mexico.

Perennial; culms in large dense clumps 1–1.7 meters high, scabrous below the panicle; basal sheaths strongly compressed, keeled, the upper rounded; ligule narrower than the sheath, usually about 2 mm. long; blades elongate, attenuate, 1–4 mm. wide, folded at the base, the margins strongly retrorsely scabrous; panicles 25–50 cm. long, dense, the branches narrowly ascending or appressed, densely flowered, naked at the base, the lower ones 10–15 cm. long, sometimes rather distant, the upper ones shorter and approximate; spikelets 2 mm. long, acute or subobtusate, pale, scabrous; lemma about as long as the glumes, scaberulous, awnless or mucronate.

Muhlenbergia pusilla Steud. Syn. Gram. 177. 1854. *M. bourgaei* Fourn. ex Hemsl. Biol. Centr. Amer. Bot. 3: 539, name only, 1885; Mex. Pl. Gram. 86. 1886.

Damp meadow, mountains above Totonicapán, Dept. Totonicapán, 2,800–3,100 meters, *Standley* 84470. Central and southern Mexico.

Annual; culms 3–30 cm. high, erect, freely branching from the base; sheaths longer than the internodes, glabrous, with thin hyaline margins; ligule thin, about 3 mm. long, acute; blades as much as 5 cm. long, less than 1 mm. wide, minutely pubescent on the upper surface; panicles 1–4 cm. long, narrow and rather loose, the branches ascending or appressed, sometimes spreading, floriferous from the base, or the lowermost naked at the base, few-flowered; spikelets 2.5–3 mm. long, the pedicels short, usually appressed; glumes equal, one-half to two-thirds as long



FIG. 70. *Muhlenbergia orophila*. Plant, $\times 1$; spikelet, $\times 10$.

as the floret, the first acute, entire, the second broader, 3-toothed; lemma acute, minutely toothed, densely pilose on the lower half, the very slender flexuous awn 5-10 mm. long.

Muhlenbergia quadridentata (H.B.K.) Kunth, Rév. Gram. 1: 64. 1829. *Podosaeum quadridentatum* H.B.K. Nov. Gen. & Sp. 1: 130. 1815. *P. gracile* H.B.K. Nov. Gen. & Sp. 1: 131. 1815. *Trichochloa quadridentata* Roem. & Schult. Syst. Veg. 2: 388. 1817.

Pine-*Juniperus* woods near Tojquiá, summit of Sierra de los Cuchumatanes, Dept. Huehuetenango, 3,700 meters, *Steyermark* 50229. Southern Mexico.

Very similar in habit and aspect to *M. montana*, differing primarily in the unequal glumes, the second with very shallow lobes, the sparsely pilose lemma, and the usually shorter awn, 5-10 mm. long.

Muhlenbergia ramulosa (H.B.K.) Swallen, Contr. U. S. Nat. Herb. 29: 204. 1947. *Vilfa ramulosa* H.B.K. Nov. Gen. & Sp. 1: 137. 1815. *Sporobolus ramulosus* Kunth, Rév. Gram. 1: 68. 1829.

Open ground and damp meadows, sometimes a weed in corn-fields, 2,000-3,000 meters; Guatemala; Chimaltenango; Totonicapán; Huehuetenango; Quezaltenango. Mexico to Costa Rica.

Annual; culms 5-20 cm. high, very slender, erect or spreading, rather freely branching; sheaths usually much shorter than the internodes, glabrous; blades 5-20 mm. long, less than 1 mm. wide, pilose on the upper surface; panicles mostly 3-4 cm. long, 5-15 mm. wide, or those of the branches reduced, the slender branches rather stiffly ascending; spikelets short-pedicellate, 0.8-0.9 mm. long, the glumes less than half as long, obtuse, the lemma acute, awnless, glabrous or nearly so.

Muhlenbergia setarioides Fourn. Mex. Pl. 2: 84. 1886. *M. sylvatica* var. *setarioides* Beal, Grasses N. Amer. 2: 249. 1896. *M. polypogonoides* Hack. Ann. Naturhist. Hofmus. Wien 17: 253. 1902.

Moist or wet forests and shady banks, 1,500-2,400 meters; Escuintla; Guatemala; Sacatepéquez; Quezaltenango; San Marcos. Mexico (Veracruz) to Panama.

Straggling, freely branching perennial; culms as much as 1 meter long, usually with a long decumbent or creeping rooting base, many-noded, the internodes relatively short, glabrous; sheaths longer or shorter than the internodes, glabrous or scaberulous; ligule 1-2 mm. long, thin, lacerate; blades 2-12 cm. long, 3-8 mm. wide, thin, flat, lax, scabrous; panicles 5-15 cm. long, rather dense, interrupted, the short densely flowered branches narrowly ascending or appressed; spikelets subsessile or short-pedicellate; glumes acuminate, mostly 1.5-2 mm. long, the second a little longer than the first, thin, with a prominent green midnerve; lemma 2 mm. long, acute, pilose on the lower part, scabrous above, the awn 2-10 mm. long, slender, flexuous.

Muhlenbergia tenella (H.B.K.) Trin. Gram. Unifl. 192. 1824. *Podosaemum tenellum* H.B.K. Nov. Gen. & Sp. 1: 128. 1815. *Muhlenbergia exilis* Fourn. Mex. Pl. 2: 84. 1886.

Damp thickets, shady banks, and moist cliffs, 500–1,800 meters; Jutiapa; Sacatepéquez; Chimaltenango; Escuintla; Suchitepéquez. Mexico to Panama.

Delicate annual; culms 8–20 cm. long, freely branching, erect or usually decumbent-spreading; sheaths pilose or nearly glabrous; ligule 0.5 mm. long; blades 1–3 cm. long, mostly less than 1 mm. wide, flat, pilose, especially on the upper surface; panicles 4–10 cm. long, the branches ascending or appressed, rather distant, solitary, closely flowered to the base, the branchlets appressed; spikelets short-pedicellate, appressed; body of glumes about 0.5 mm. long, abruptly narrowed to a short awn; lemma 2 mm. long, glabrous, the callus minutely pubescent, the awn very slender, mostly 10–20 mm. long.

Muhlenbergia vaginata Swallen, Contr. U. S. Nat. Herb. 29: 406. 1950.

Alpine meadows, limestone hills, and sand flats, 1,500–3,800 meters; Huehuetenango; Quezaltenango; San Marcos, type from near San Sebastian (*Steyermark* 35598).

Annual; culms very slender, decumbent-spreading with ascending ends, rather freely branching, the branches short with very short fasciculate branches; sheaths short, crowded, glabrous; ligule 1.2–2 mm. long, thin, decurrent; blades 6–14 mm. long, 0.6–1 mm. wide, flat, firm, strongly nerved, acute, the tip navicular, smooth beneath, scabrous above and on the margins; panicles not more than 1.5 cm. long, usually much less, narrow, few-flowered; spikelets 1.8 mm. long; glumes one-third to nearly one-half as long as the spikelet, subequal, irregularly obtuse, the first sometimes notched; lemma acute, strongly nerved, sparsely pubescent at the base, awnless.

OLYRA L.

Plants monoecious; staminate and pistillate spikelets in the same inflorescence, the pistillate on the upper branches and at the ends of the lower branches, the staminate scattered along the lower branches; pedicels of pistillate spikelets enlarged toward the summit; pistillate spikelet: first glume wanting; second glume and sterile lemma 5–7-nerved, caudate-acuminate, the glume much longer than the lemma; fruit bony-indurate, white, the margins inrolled, clasping the palea; staminate spikelets much smaller, reduced to the lemma and palea.

Erect or clambering, usually woody perennials with broad flat blades and open panicles terminating the main culm and branches.

Species about 25, American tropics; one in Africa.

Culms as much as 5 meters long, branching; fruit smooth *O. latifolia*.

Culms about 1 meter high, simple; fruit villous on the margins of the lemma.

O. yucatana.



FIG. 71. *Olyra latifolia*. Plant, $\times \frac{1}{2}$; pistillate and staminate spikelets, and fertile floret, $\times 5$.

Olyra latifolia L. Syst. Nat. ed. 10. 2: 1261. 1759. *O. paniculata* Swartz, Prodr. Veg. Ind. Occ. 21. 1788. *O. arundinacea* H.B.K. Nov. Gen. & Sp. 1: 197. 1816. *O. latifolia* var. *arundinacea* Griseb. Fl. Brit. W. Ind. 535. 1864. Figure 71.

Wet thickets, forests, and brushy slopes, up to 550 meters; Petén; Alta Verapaz; Izabal; Suchitepéquez; Retalhuleu. Southern Florida; West Indies; Mexico to Bolivia, northern Argentina, and Brazil.

Culms erect, freely branching from the upper nodes, as much as 5 meters long, the branches often clambering over the surrounding vegetation; sheaths glabrous, pubescent or hispid, usually longer than the internodes, the lower ones of the main culm short, nearly bladeless; blades asymmetrical, 10–30 cm. long, 2–9.5 cm. wide, or those of the branches smaller, acuminate, scabrous, short-petiolate, the petioles hispid; panicles 5–15 cm. long, terminal on the main culm and branches, sometimes axillary from the upper sheath, the branches usually narrowly ascending, with a single pistillate spikelet at the end, the staminate spikelets scattered on short branchlets below it; staminate spikelets 5 mm. long, the lemma awned, the awn 2–3 mm. long; second glume and sterile lemma of the pistillate spikelets 10–25 mm. long, long-acuminate, divergent, exposing the fruit; fruit 5–6 mm. long, smooth and shining, white to drab.

Olyra yucatana Chase, Proc. Biol. Soc. Washington 21: 178. 1908.

Forests and dense brush, Petén. British Honduras; south-eastern Mexico.

Perennial; culms in small clumps, simple, erect, about 1 meter tall; blades unsymmetrical, 10–16 cm. long, 2–5 cm. wide, short-petiolate, the petioles hispid; panicles narrow, terminal and axillary, 5–10 cm. long; staminate spikelets 6 mm. long, purple; pistillate spikelets 15–25 mm. long; fruit 7 mm. long, the lemma densely villous on the margins in the lower half.

OPLISMENUS Beauv.

Spikelets subsessile, solitary or in pairs, crowded, in two rows on one side of a slender rachis; glumes nearly equal, more than half as long as the sterile lemma, 3–5-nerved, the first long-awned, the second short-awned; sterile lemma longer than the fruit, mucronate or short-awned, enclosing a hyaline palea; fruit elliptic, acute, indurate, smooth and shining, the margins firm, enclosing the palea.

Creeping, branching annuals or perennials with thin lanceolate or ovate-lanceolate acuminate blades and inflorescences composed of few to several stiffly ascending or spreading racemes approximate or rather distant on a main axis.

Species about 10, in the tropics of both hemispheres.

Rachis of racemes densely hairy; awns antrorsely scabrous. *O. burmanni*.
Rachis of racemes scabrous; awns smooth.

Racemes loosely flowered, 2-5 cm. long *O. rariflorus*.

Racemes densely flowered, mostly less than 2 cm. long.

Rachis of racemes 2-3 mm. long, the few spikelets appearing as if in clusters.

O. setarius.

Rachis of racemes 1-2 cm. long, the spikelets not clustered . . . *O. hirtellus*.

Oplismenus burmanni (Retz.) Beauv. Ess. Agrost. 54. 1812. *Panicum burmanni* Retz. Obs. Bot. 3: 10. 1783. *Orthopogon burmanni* Trin. Fund. Agrost. 181. 1820. *Oplismenus cristatus* Presl, Rel. Haenk. 1: 323. 1830. *O. affinis* Presl, Rel. Haenk. 1: 323. 1830.

Moist forests, thickets, and savannas, a common weed in fields and waste places up to about 2,500 meters; Alta Verapaz; Izabal; Jalapa; Jutiapa; Santa Rosa; Guatemala; Sacatepéquez; Retalhuleu; Quezaltenango. British Honduras; tropics of both hemispheres.

Low creeping annual; culms slender, 15-50 cm. long, nearly simple to freely branching, with short internodes, decumbent or prostrate-spreading with ascending branches; sheaths usually much shorter than the internodes, sparsely to densely papillose-hispid, the margins densely ciliate; blades broadly lanceolate-elliptic, often asymmetrical, acuminate, 1.5-5 cm. long, 5-15 mm. wide, glabrous to pubescent or hirsute, the margins scabrous; inflorescence 1-6 cm. long, frequently long exserted, of 3-6, rarely 10, short, approximate racemes, the axis densely villous, flexuous; racemes 0.5-2 cm. long, ascending, the rachis densely villous; spikelets 3 mm. long, usually densely villous; glumes minutely lobed, about 2 mm. long, the second a little longer than the first; awns retrorsely scabrous, that of the first glume 10-14 mm. long, of the second 3-8 mm. long; sterile lemma minutely lobed, awnless, or with an awn 1-3 mm. long; fruit 2 mm. long, narrowly elliptic, acute.

Oplismenus hirtellus (L.) Beauv. Ess. Agrost. 54, 168. 1812. *Panicum hirtellum* L. Syst. Nat. ed. 10. 2: 870. 1759. *Orthopogon cubensis* Spreng. Syst. Veg. 1: 307. 1825. *Echinochloa cubensis* Schult. Mant. 3 (Add. 1): 596. [1827]. *Oplismenus cubensis* Kunth, Rév. Gram. 1: 45. 1829. *Panicum cubensis* Steud. Nom. Bot. ed. 2. 2: 255. 1841. *Oplismenus chondrosioides* Fourn. Mex. Pl. 2: 39. 1886.

Moist hills and fields, forests, thickets, along streams, and river bluffs, up to 1,800 meters; Petén; Alta Verapaz; Izabal; Sacatepéquez; Jalapa; Guatemala; Chimaltenango; Quezaltenango. British Honduras; West Indies; Mexico to Argentina.

Widely spreading perennial; culms with short internodes, freely branching, decumbent-spreading and rooting at the nodes, the erect or ascending branches 20-70 cm. long; sheaths glabrous to densely papillose-hispid, the margins ciliate, the lower ones usually much shorter than the internodes, the upper frequently overlapping; blades 4-10 cm. rarely 15 cm. long, 1-2 cm. wide, acuminate, usually

asymmetric, rather thin, glabrous or sometimes pubescent, the margins scabrous; inflorescence 5–15 cm. long, of 3–7 stiffly ascending, rather distant racemes 1–2 cm. rarely 3 cm. long, the rachis more or less papillose-hispid, especially at the base; spikelets 3–3.5 mm. long, glabrous to sparsely pilose; glumes about equal, 2 mm. long; awns glabrous, usually purplish, that of the first glume 5–10 cm. long, that of the second about 2 mm. long; sterile lemma acuminate; fruit 3 mm. long, elliptic, acute, minutely striate.

Oplismenus rariflorus Presl, Rel. Haenk. 1: 320. 1830. *O. liebmanni* Fourn. Mex. Pl. 2: 38. 1886. *O. thiebauti* Fourn. Mex. Pl. 2: 39. 1886.

Moist shady places and pine-covered slopes up to 1,500 meters; Zacapa; Guatemala. Southern Mexico; Honduras; Colombia and Venezuela to Peru.

Similar to *O. hirtellus*, differing in the slender few-flowered racemes 2–5 cm. long, the spikelets distant, sometimes as much as 1 cm. apart.

Oplismenus setarius (Lam.) Roem. & Schult. Syst. Veg. 2: 481. 1817. *Panicum setarium* Lam. Tabl. Encycl. 1: 170. 1791. Figure 72.

Shady places, up to 1,500 meters; Alta Verapaz; Santa Rosa; Guatemala. Southeastern United States; West Indies; southern Mexico; Colombia; Brazil; Uruguay; Paraguay; and northern Argentina.

Perennial; culms slender, widely spreading, freely branching, the flowering culms mostly 20–30 cm. high; blades ovate or usually ovate-lanceolate, commonly 1–3 cm. or as much as 6 cm. long, 4–10 mm. wide; racemes 4–6, distant, the rachis less than 5 mm. long, usually with 4 to 8 crowded spikelets; awn of first glume 4–8 mm. long.

ORTHOCLADA Beauv.

Spikelets falling entire, 1–2-flowered, the florets distant, the second rudimentary; glumes acuminate, awnless, the first narrow, 3-nerved, the second broader, 5-nerved; lemma acuminate, awn-pointed, 5-nerved, the nerves obscure except near the summit.

Perennials with lanceolate, flat, transversely veined, petiolate blades, and diffusé panicles, the branches spikelet-bearing only near the ends. Monotypic.

Orthoclada laxa (L. Rich.) Beauv. Ess. Agrost. 70, 149, 168. 1812. *Aira laxa* L. Rich. Act. Soc. Hist. Nat. Paris 1: 106. 1792. *Panicum rariflorum* Lam. Encycl. 4: 746. 1798. *Orthoclada rariflora* Beauv. Ess. Agrost. 70. pl. 14, f. 9. 1812. Figure 73.

Wet thickets and forests at low altitudes; Alta Verapaz; Izabal. Southeastern Mexico (Oaxaca, Veracruz, and Tabasco); Honduras; Nicaragua; Colombia to Surinam, Peru, and Brazil.



FIG. 72. *Oplismenus setarius*. Plant, $\times \frac{1}{2}$; two views of spikelet, and floret, $\times 10$.



FIG. 73. *Orthoclada laxa*, about $\times \frac{1}{2}$.

Erect or decumbent-spreading, sparingly stoloniferous perennial; culms 60 cm. to more than 2 meters long, glabrous; sheaths rather densely pilose or sometimes nearly glabrous, usually shorter than the internodes; ligule a very short ciliate membrane; blades 5-17 cm. long, 1-3 cm. wide, acuminate, narrowed at the base to a petiole 2-3 cm. long, hispid on the upper surface, glabrous below with conspicuous cross-veins; panicle diffuse, 15-30 cm. long, about as wide, the branches rather readily disarticulating, stiffly spreading, spikelet-bearing only

at the ends; spikelets 6–7 mm. long; glumes subequal, acuminate, 3–4 mm. long, the first 3-nerved, the second 5-nerved, scabrous on the nerves; lemma about 6 mm. long, 5-nerved, sparsely scabrous.

ORYZA L.

Spikelets 1-flowered, disarticulating below the glumes, laterally compressed; glumes narrow, much shorter than the lemma (in our species); lemma indurate, rigid, keeled, 3-nerved, awned or sometimes awnless, sparsely to rather densely hispid; palea similar to the lemma but narrower and with no midnerve on the back, the two nerves close to the margins.

Annuals or perennials with flat blades and open or contracted panicles.

Species probably about 20, in tropical Asia, Africa, and America.

Plants annual, cultivated, sometimes escaped.....*O. sativa*.

Plants perennial, native.

Spikelets 8–9 mm. long; awns 2–3 cm. long.....*O. alta*.

Spikelets 5 mm. long; awns 1–2 cm. long.....*O. latifolia*.

Oryza alta Swallen, Carnegie Inst. Washington Pub. 461: 156. 1936.

Swamps and river margins at low altitudes. British Honduras (Stann Creek District); Brazil, the type from Obidos, Pará; Paraguay.

Perennial; culms erect or leaning, 3 to more than 4 meters tall, glabrous; sheaths shorter than the internodes, auriculate, glabrous, the margins usually hispid-ciliate; ligule membranaceous, lacerate to hispid-ciliate, 5 mm. long; blades flat, acuminate, 25–80 cm. long, 20–28 mm. wide, scaberulous, the margins scabrous-serrulate; panicles open, drooping, 30–40 cm. long, the branches rather distant, densely pilose in the axils, naked on the lower half, the lower whorled, as much as 15 cm. long; spikelets 8–9 mm. long, appressed on the short branchlets, the lateral short-pedicellate, the terminal long-pedicellate; glumes lunate, narrow, acuminate, 1-nerved, about half as long as the spikelet; lemma minutely pitted, hispid on the keels and margins, unsymmetrically narrowed at the summit to a short scabrous beak, terminating in a scabrous or somewhat appressed-hispid awn 2–3 cm. long; palea slightly longer than the lemma, similar in texture, terminating in a hispid beak about 1 mm. long.

Oryza latifolia Desv. Jour. de Bot. Desv. II. 1: 77. 1813.
O. sativa latifolia Doell in Mart. Fl. Bras. 2(2): 7. 1871.

Ponds, swamps, and ditches at low altitudes; Izabal; Retalhuleu. British Honduras; southern Mexico to Panama; West Indies; Colombia to Surinam, Bolivia, Paraguay, and Brazil.

Coarse erect perennial; culms 1–2 meters high, succulent, scaberulous; sheaths elongate, longer than the internodes, keeled toward the summit, glabrous, pu-



FIG. 74. *Oryza sativa*. Plant, $\times \frac{1}{2}$; spikelet, $\times 5$.

bescent on the collar, auriculate, the auricles sometimes hispid-ciliate; ligule 3–5 mm. long, hispid; blades mostly 30–50 cm. long, 1–3.5 cm. wide, scabrous and sparsely pubescent on both surfaces, the margins prominently hispid-scabrous; panicles 30–40 cm. long, the branches verticillate, ascending, scabrous, as much as 25 cm. long, naked toward the base; spikelets 5 mm. long, short-pedicellate, oblong, sparsely hispid, the awns 1–2 cm. long or sometimes wanting; glumes narrow, acuminate, 1 mm. long.

Oryza sativa L. Sp. Pl. 333. 1753. *Arroz; rice*. Figure 74.

Cultivated throughout tropical and warm temperate regions at low altitudes.

Annual; culms erect, 1 meter high or more; sheaths all longer than the internodes, soft, glabrous, auriculate, the auricles sometimes hispid-ciliate; ligule acuminate, mostly 1–2 cm. long; blades 20–40 cm. long, 1–1.5 cm. wide, acuminate, scabrous; panicles 10–30 cm. long, narrow, dense, becoming top-heavy; spikelets oblong, 7–10 mm. long; glumes narrow, 2–3 mm. long; lemmas hard, ridged by the lateral nerves, more or less hispid, especially on the keel, awnless or awned, the awn variable.

PANICUM L.

Spikelets paniculate or sometimes short-pedicelled in one-sided racemes; first glume minute to nearly as long as the spikelet; second glume and sterile lemma nearly equal, similar, the lemma often enclosing a hyaline palea and sometimes a staminate flower; fertile floret indurate, the nerves obsolete, the margins of the lemma inrolled, firmly enclosing the palea.

Annuals or perennials, exceedingly variable in habit, size, and appearance.

Species about 600, in warmer regions of both hemispheres.

Basal blades distinctly different from the culm blades, forming a winter rosette; culms at first simple, finally sparingly to freely branching.

Plants forming soft, dense cushions, the culms branching from the base only.

Sheaths conspicuously retrorsely pilose; spikelets 1.9–2 mm. long, papillose-pilose. *P. xalapense*.

Sheaths glabrous or ciliate only.

Blades glabrous on the upper surface; spikelets 1.5–1.6 mm. long.

P. polycaulon.

Blades pilose; spikelets 1.3–1.5 mm. long. *P. strigosum*.

Plants not forming soft cushions, the culms branching from the middle and upper nodes.

Spikelets attenuate at the base, prominently pustulose; blades firm, linear.

Spikelets fusiform, 3.3–3.5 mm. long, pointed beyond the fruit.

P. fusiforme.

Spikelets obovate, 2–2.5 mm. long, not pointed beyond the fruit.

Plants glabrous or nearly so; spikelets 2 mm. long, subsecund along the suberect panicle branches. *P. neuranthum*.

- Plants pubescent, at least on the lower half; spikelets mostly about 2.4 mm. long. *P. arenicoloides*.
- Spikelets not attenuate at the base.
- Ligule prominent, composed of hairs 3–5 mm. long.
- Sheaths glabrous or appressed-pubescent.
- Spikelets 1.2 mm. long. *P. longiligulatum*.
- Spikelets not more than 1 mm. long. *P. wrightianum*.
- Sheaths conspicuously villous.
- Spikelets 2.2–2.4 mm. long.
- Culms conspicuously pilose with long spreading hairs; autumnal culms prostrate. *P. villosissimum*.
- Culms with appressed hairs; autumnal culms stiffly ascending. *P. pseudopubescens*.
- Spikelets 1.9–2 mm. long; culms freely branching from the middle and upper nodes. *P. olivaceum*.
- Ligule very short, inconspicuous.
- Spikelets glabrous or nearly so.
- Blades cordate, 5–15 mm. wide, ciliate at the base. . . . *P. sphaerocarpon*.
- Blades not cordate, usually less than 5 mm. wide.
- Spikelets 2 mm. long, strongly nerved, asymmetrically pyriform.
- Blades firm, glabrous above; culms stiffly ascending. *P. lancearium*.
- Blades lax, softly pubescent on both surfaces; culms decumbent. *P. patulum*.
- Spikelets 1.1 mm. long, not strongly nerved. *P. chamaelonche*.
- Spikelets pubescent.
- Spikelets 1.5 mm. long; blades with conspicuous white cartilaginous margins. *P. albomarginatum*.
- Spikelets 2 mm. long; nodes bearded. *P. nitidum*.
- Basal blades similar to the culm blades; branches of the culm, if any, not reduced or with greatly reduced blades.
- Plants annual.
- Fruit transversely rugose; spikelets short-pedicellate along the raceme-like branches.
- Spikelets 2 mm. long; culms decumbent-spreading, freely branching. *P. reptans*.
- Spikelets 2.5–4 mm. long.
- Spikelets glabrous, usually dark brown, 2.5–3 mm. long. *P. fasciculatum*.
- Spikelets densely pubescent, 3.5–4 mm. long. *P. molle*.
- Fruit smooth; spikelets in open panicles.
- First glume about one-fourth as long as the spikelet, acute or obtuse.
- Glabrous, rather succulent, aquatic or subaquatic grasses.
- Spikelets 4–5 mm. long; culms elongate, as much as 2 cm. thick. *P. elephantipes*.

Spikelets 3 mm. long; culms 20–40 cm. long, slender. *P. aquaticum*.

First glume at least more than half as long as the spikelet.

Culms erect; spikelets at least 2 mm. long; blades elongate.

Panicles terminal and axillary, crowded, implicate. . . . *P. cayennense*.

Panicles terminal only, not crowded or implicate.

Spikelets 2.5–3.3 mm. long. *P. hirticaule*.

Spikelets 4–4.5 mm. long.

First glume usually more than three-fourths as long as the spikelet. *P. pampinosum*.

First glume about half as long as the spikelet. *P. lepidulum*.

Spikelets 5–6 mm. long. *P. parcum*.

Culms decumbent-spreading; spikelets 1.2–1.5 mm. long; blades ovate or elliptic, cordate.

Spikelets placed obliquely on the pedicels, papillose-hirsute.

P. hirtum.

Spikelets not placed obliquely, pubescent. *P. trichoides*.

Plants perennial.

Palea of sterile floret becoming enlarged, indurate; spikelets borne on the upper part of the branches or toward the ends only. *P. hians*.

Palea of sterile floret not conspicuously enlarged.

Spikelets short-pedicellate along one side of the panicle branches, forming spike-like or one-sided racemes.

Fruit transversely rugose.

Nodes glabrous; panicle branches short, closely appressed.

Spikelets 2.8–3 mm. long. *P. paludivagum*.

Spikelets not over 2.4 mm. long. *P. geminatum*.

Nodes bearded; panicle branches ascending or spreading.

P. purpurascens.

Fruit smooth, not rugose.

Blades lanceolate or ovate-lanceolate.

Spikelets sparsely pilose or hispid, the sterile lemma with two crateriform glands on the back.

Spikelets 2 mm. long, pilose. *P. pulchellum*.

Spikelets 3.6 mm. long, sparsely hispid. *P. biglandulare*.

Spikelets glabrous, glandless.

Blades 1–5 cm. long; racemes few to several, scarcely crowded.

P. stoloniferum.

Blades 5–11 cm. long; racemes numerous, crowded.

P. frondescens.

Blades linear, often elongate, sometimes cordate at the base.

Spikelets nearly sessile, densely arranged along one side of the pilose rachis.

Culms as much as 2 meters high; panicles 25–45 cm. long.

P. milleflorum.

Culms not more than 1 meter high; panicles 5–15 cm. long.

P. pilosum.

Spikelets in part on short branchlets on the lower side of the rachis.

Blades 20–25 cm. long, 1.5–3 cm. wide; panicles 20–40 cm. long.

P. stagnatile.

Blades not more than 15 cm. long; panicles 5–30 cm. long.

Nodes pubescent. *P. polygonatum.*

Nodes glabrous.

Blades narrowed toward the base. *P. laxum.*

Blades somewhat cordate at the base. *P. boliviense.*

Spikelets in open or contracted panicles, but not on one-sided racemes.

Fruit transversely rugose.

Culms with a corm-like base. *P. bulbosum.*

Culms with short stout rhizomes, in large coarse clumps.

P. maximum.

Fruit not rugose.

First glume acute or acuminate, two-thirds to three-fourths as long as the spikelet.

Panicles terminal and axillary, crowded, implicate. *P. rudgei.*

Panicles terminal only, not crowded or implicate. Spikelets more than 3 mm. long.

Spikelets 5.5–6 mm. long; fruit with a laterally compressed crest.

Culms decumbent-spreading. *P. zizanioides.*

Spikelets not more than 4.5 mm. long; fruit not crested.

Culms with creeping rhizomes.

Culms erect; spikelets 4–4.5 mm. long. *P. lundellii.*

Culms straggling, 2–4 meters long; spikelets 3.2–4 mm. long. *P. altum.*

Culms without rhizomes.

Culms coarse, 1.5–2 meters high; spikelets 3.5–4.2 mm. long. *P. ichnanthoides.*

Culms 10–20 cm. high; spikelets 1.5–1.6 mm. long.

P. furvum.

First glume obtuse or not more than half as long as the spikelet.

Panicles very narrow, few-flowered. Culms erect, wiry.

Spikelets pointed; second glume and sterile lemma exceeding the fruit. *P. tenerum.*

Spikelets blunt; second glume and sterile lemma about as long as the fruit.

Spikelets 2 mm. long, attenuate at the base. *P. stenodoides.*

Spikelets 1.5 mm. long, not attenuate at the base. *P. stenodes.*

Panicles many-flowered, usually open.

First glume obtuse or rounded, about two-thirds as long as the spikelets.

Spikelets 1.5 mm. long.

Culms decumbent or creeping, very slender; blades 1-3 cm. long. *P. parvifolium*.

Culms erect, firm; blades 3-6 cm. long. *P. cyanescens*.

Spikelets 2 mm. long or longer.

Spikelets 2 mm. long, appearing clustered on the branches.

. *P. sellowii*.

Spikelets 3-3.5 mm. long, not clustered. *P. glutinosum*.

First glume acute or less than half the length of the spikelet.

Culms tufted, erect.

Sheaths rounded; nodes densely pubescent or bearded.

Spikelets 3 mm. long, acuminate, the first glume a small nerveless scale. *P. tuerckheimii*.

Spikelets 2 mm. long, acute, the first glume acute or sub-obtuse, about half as long as the spikelet. *P. hirsutum*.

Sheaths compressed, keeled; nodes glabrous. *P. agrostoides*.

Culms decumbent-spreading or clambering.

Blades as much as 1 meter long, 6 cm. wide. *P. grande*.

Blades much smaller.

Second glume and sterile lemma 5-nerved; spikelets blunt, turgid, the fruit usually sparsely to rather densely silky-hairy.

Culms pubescent, villous, or papillose-pilose.

Spikelets 1.5 mm. long, arranged in clusters on the branches. *P. schiffneri*.

Spikelets 2.3-3 mm. long, evenly distributed on the branches, not in clusters.

Panicles about 6 cm. long, few-flowered; spikelets 2.9-3 mm. long; sheaths much longer than the internodes. *P. incumbens*.

Panicles about 20 cm. long, many-flowered; spikelets 2.3-2.5 mm. long; sheaths mostly shorter than the internodes. *P. cayoense*.

Culms glabrous or nearly so.

Culms slender, creeping or clambering; spikelets 1.5-2 mm. long, densely crowded in clusters.

Culms creeping; blades falcate. *P. schmitzii*.

Culms clambering; blades not falcate.

Spikelets 1.5 mm. long. *P. arundinariae*.

Spikelets 2 mm. long. *P. breviramsum*.

Culms coarser; spikelets 2-2.5 mm. long.

Blades 12-25 mm. wide; fruit glabrous; culms sparingly branching. *P. parviglume*.

Blades 4-10 mm. wide; fruit sparsely silky; culms rather freely branching. *P. guatemalense*.

Second glume and/or sterile lemma 3- or 7-9-nerved.

Second glume and sterile lemma 3-nerved; panicles diffuse, the spikelets on long capillary pedicels.

Spikelets 1.2-1.5 mm. long; first glume one-fifth as long as the spikelet *P. trichanthum*.

Spikelets 1.8-2 mm. long; first glume half as long as the spikelet *P. bartlettii*.

Second glume and sterile lemma 7-9-nerved (sterile lemma 3-nerved in *P. venezuelae*).

Second glume 3-nerved. Spikelets crowded on short, distant, raceme-like branches *P. venezuelae*.

Second glume 7-9-nerved.

Blades less than 5 cm. usually less than 4 cm. long.

Spikelets 2-2.1 mm. long; blades velvety-pubescent, ciliate only at the base. *P. furtivum*.

Spikelets 1.5-1.6 mm. long; blades pubescent but not velvety, strongly ciliate nearly to the apex *P. blakei*.

Blades, or at least some of them, more than 5 cm. long.

Blades papillose-hispid with long hairs; panicles sparsely few-flowered *P. alsophilum*.

Blades not papillose-hispid; panicles relatively densely flowered.

Spikelets pubescent.

Spikelets 1.8-1.9 mm. long; panicle branches pubescent, implicate *P. viscidellum*.

Spikelets 2.5-2.8 mm. long; panicle branches glabrous, not implicate.

P. albomaculatum.

Spikelets glabrous.

Spikelets 3.5-4 mm. long *P. transiens*.

Spikelets 2.7 mm. long; second glume and sterile lemma shorter than the fruit.

P. alcobense.

Spikelets 2.2-2.5 mm. long; second glume and sterile lemma covering the fruit.

Blades 7-13 mm. wide, pubescent.

P. ramiparum.

Blades 3-7 mm. wide, glabrous. Panicle branches spreading, implicate.

P. umbonulatum.

Panicum agrostoides Spreng. Pl. Pugill. 2: 4. 1815. *P. elongatum ramosius* Mohr, Contr. U. S. Nat. Herb. 6: 357. 1901.

Wet ground, New River at Orange Walk, British Honduras. Not known from Guatemala. Eastern United States.

Perennial; culms in dense clumps, erect, 50–100 cm. or more tall, glabrous; sheaths longer than the internodes, compressed, keeled; ligule membranaceous, about 1 mm. long; blades 20–50 cm. long, 5–12 mm. wide; panicles 10–30 cm. long, terminal and axillary, the stiff branches ascending or spreading, with divergent, rather densely flowered branchlets; spikelets 1.8–2.2 mm. long, the first glume about half as long as the spikelet; second glume and sterile lemma subequal, the midnerve scabrous toward the summit; fruit 1.3 mm. long.

Panicum albomaculatum Scribn. U. S. Dept. Agr. Div. Agrost. Circ. 19: 2. 1900.

Shady banks near Antigua, Sacatepéquez, *Hitchcock* 9139. Mexico (Jalisco; Michoacán).

Perennial; culms erect or geniculate-ascending from a hard knotty base, at first simple, finally branching from lower and middle nodes; sheaths long, usually exceeding the internodes, densely ciliate on the margins, more or less spotted or mottled; blades 6–17 cm. long, 6–15 mm. wide, lanceolate, ascending or spreading, the margins very scabrous, ciliate at the rounded base, otherwise glabrous or sometimes sparsely hispid; panicles 10–16 cm. long, as much as 12 mm. wide, the slender, flexuous, few-flowered branches spreading or sometimes reflexed, more or less implicate; spikelets 2.5–2.8 mm. long, subobtusate, sparsely pubescent; first glume one-third to one-half as long as the spikelet, acute or subobtusate; second glume and sterile lemma equal, scarcely as long as the fruit.

Panicum albomarginatum Nash, Bull. Torrey Club 24: 40. 1897.

Pine lands, Alta Verapaz. British Honduras (El Cayo District); southeastern United States; Cuba.

Perennial; culms slender, erect, wiry, mostly 15–40 cm. tall; blades 4–6 cm. (rarely 8 cm.) long, 4–6 mm. wide, glabrous or nearly so, the conspicuous white cartilaginous margins scabrous, the uppermost blade not much reduced; ligule very short; panicles usually about 4 cm. long, the branches ascending or spreading; spikelets 1.5 mm. long, pubescent. Autumnal phase bushy-branched, the branches rather closely appressed, the blades and panicles usually greatly reduced.

Panicum alcobense Swallen, Contr. U. S. Nat. Herb. 29: 423. 1950.

Oak woods and pine forests. Known only from the summit of Cerro Alcoba, Jalapa, about 1,700 meters (*Steyermark* 32515, type).

Annual(?); culms about 80 cm. long, straggling, branching, pilose with appressed hairs, the nodes pubescent; sheaths mostly a little shorter than the internodes, glabrous, the margins densely papillose-ciliate; ligule a ciliate mem-

brane about 1 mm. long including the hairs, blades 4–7.5 cm. long, 5–8 mm. wide, subacuminate, glabrous, the margins scabrous, sparsely papillose-hispid-ciliate at the base; panicles 4–6 cm. long, 2–3 cm. wide, the branches ascending, glabrous or scabrous, the lower ones 1–2 cm. long; spikelets 2.7 mm. long, 1 mm. wide, sparsely pubescent; first glume 1–1.3 mm. long, nerveless; second glume and sterile lemma equal, a little shorter than the fruit, obtuse, the glume 7-nerved, the lemma 5-nerved; fruit 2.2 mm. long, about 1 mm. wide, ovate, pale, smooth and shining.

Panicum alsophilum Swallen, Contr. U. S. Nat. Herb. 29: 422. 1950.

Oak woods. Known only from the summit of Cerro Alcoba, east of Jalapa, about 1,700 meters (*Steyermark* 32513, type).

Perennial(?); culms spreading, about 50 cm. long, with nearly equal internodes, papillose-pilose with appressed or spreading hairs, the nodes more or less bearded; sheaths about as long as or longer than the internodes, papillose-pilose, densely pilose on the collar; ligule ciliate, 0.3 mm. long; blades 5–10 cm. long, 4–9 mm. wide, acuminate, rather conspicuously papillose-pilose below, papillose-hispid above, the margins scabrous and papillose-hispid-ciliate; panicle 8 cm. long, about as broad, the slender branches spreading, few-flowered; spikelets 2.4 mm. long, glabrous, or the second glume sparsely pilose; first glume 0.5–1 mm. long, nerveless; second glume and sterile lemma equal, covering the fruit; fruit 2 mm. long, elliptic, subacute, pale, shining.

Panicum altum Hitchc. & Chase, Contr. U. S. Nat. Herb. 17: 488. f. 57. 1915.

Marshes near the coast. British Honduras (Belize District). Not known from Guatemala. Panama; Trinidad and Tobago.

Perennial; culms 2–4 meters long, from strong rhizomes, stout, reedlike, tangled, decumbent and straggling at the base, glaucous, sometimes with erect sterile branches at the swollen nodes; sheaths smooth; blades 30–45 cm. long, 8–15 mm. wide, glabrous on both surfaces, the margins scabrous; panicles 20–30 cm. long, the slender scabrous branches fascicled, ascending to spreading, some of them naked at the base; spikelets 3.2–4 mm. long, short-pedicel, turgid, glabrous, gaping, the first glume about two-thirds as long as the spikelet; fruit 2–2.2 mm. long.

Panicum aquaticum Poir. in Lam. Encycl. Suppl. 4: 281. 1816.

Margins of streams and ponds and other wet places; Jutiapa (Jutiapa); Izabal (Puerto Barrios). British Honduras (Gracie Rock); Mexico (Colima); Cuba; South America as far south as Paraguay.

Perennial; culms soft, somewhat succulent, decumbent, rooting at the lower nodes, glabrous, the ascending ends mostly 20–40 cm. tall; blades flat, acute, usually stiffly ascending or spreading, 5–17 cm. long, 5–10 mm. wide; panicles

about 10 cm. long, rarely longer, the branches rather stiffly ascending; spikelets appressed, glabrous, 3 mm. long; first glume subacute, broad and clasping, about 1 mm. long; second glume and sterile lemma pointed beyond the fruit.

Panicum arenicoloides Ashe, Jour. Elisha Mitchell Soc. 16: 89. 1900. *P. orthophyllum* Ashe, Jour. Elisha Mitchell Soc. 16: 90. 1900.

Pine and pine-oak forests, mostly 900–1,500 meters; Alta Verapaz; Zacapa; Huehuetenango; Chiquimula; Jalapa. Coastal plain, North Carolina to Texas; southern Mexico; Honduras; Cuba; Colombia; Venezuela.

Perennial; culms slender, 20–50 cm. tall; lower sheaths and usually the lower blades villous; blades mostly 7–12 cm. long, 3–5 mm. wide, becoming involute toward the apex; panicles 4–6 cm. long, the rather narrowly ascending branches somewhat flexuous; spikelets 2.1–2.5 mm. long, obovate, obtuse; first glume about one-third as long as the spikelet, usually obtuse or truncate; second glume and sterile lemma equal, just covering the fruit, densely pubescent between the prominent nerves. Autumnal phase rather freely branching, becoming top-heavy, the blades somewhat reduced, finally involute.

Panicum arundinariae Trin. ex Fourn. Mex. Pl. 2: 25. 1886. *P. virgultorum* Hack. Oesterr. Bot. Zeitschr. 51: 369. 1901.

Brushy slopes and forests, 1,300–2,000 meters; Alta Verapaz; Chiquimula; Guatemala; Sacatepéquez; Huehuetenango. Southern Mexico to Panama.

Perennial; culms clambering or straggling, 0.5–1.5 meters long, freely branching, glabrous or very sparsely pubescent; sheaths shorter than the internodes, glabrous, densely pubescent on the collar; blades lanceolate, 4–15 cm. long, 5–12 mm. wide, glabrous on the lower surface, scabrous and sparsely papillose-hispid on the upper, the margins very scabrous; panicles mostly 4–8 cm. long (rarely as much as 15 cm., those of the branches often much reduced), the branches narrowly ascending to spreading, the lower rarely more than 5 cm. long, densely flowered, sometimes naked at the base; spikelets 1.5 mm. long, oval, the first glume minute, nerveless; fruit oval, smooth and shining, sparsely pilose with long appressed hairs.

Panicum bartlettii Swallen, Carnegie Inst. Washington Pub. 436: 346. 1934.

Moist forests and river bluffs, near sea level; Petén, the type from Uaxactún (*Bartlett* 12245). British Honduras; southern Mexico (Veracruz, Oaxaca, Campeche, Quintana Roo).

Perennial; culms sprawling, rooting at the lower nodes, glabrous, as much as 1.5 meters long; sheaths much shorter than the internodes, ciliate on the margins, otherwise glabrous or nearly so; blades flat, oblong-lanceolate, 10–20

cm. long, 15–25 mm. wide (rarely smaller), glabrous or sometimes pubescent, the margins scabrous; ligule 0.2–0.3 mm. long; panicle diffuse, 10–30 cm. long, as much as 25 cm. wide, the branches widely ascending; spikelets long-pedicel, 1.8–2 mm. long; first glume obtuse or subacute, half as long as the spikelet; second glume and sterile lemma equal, pointed beyond the fruit, minutely bulbate-rugose, the second glume falling away toward maturity of the spikelet; fruit 1.5 mm. long, smooth, shining.

Panicum biglandulare Scribn. & Smith, U. S. Dept. Agr. Div. Agrost. Bull. 4: 13. *pl.* 4. 1897.

Pine and pine-oak forests, 1,350–2,800 meters; Alta Verapaz; San Marcos. Guerrero; Oaxaca; Chiapas, the type from Pinabete (*Nelson* 3781).

Culms wiry, widely spreading, freely branching, rooting at the lower nodes, glabrous; sheaths much shorter than the internodes, villous-ciliate on the margins and across the back on the collar; blades 3–10 cm. long, 10–18 mm. wide, lanceolate, acuminate, more or less pilose on both surfaces; racemes 5–30 mm. long, finally spreading; spikelets 3.6 mm. long, sparsely hispid; first glume acute, one-third to one-half as long as the spikelet; second glume and sterile lemma unequal, the glume acute, the lemma acute or subacuminate, bearing a crateriform gland on either side of the midnerve toward the summit.

Panicum blakei Swallen, Contr. U. S. Nat. Herb. 29: 422. 1950.

Prairies and along trails, Izabal (Los Amates to Izabal, *Blake* 7817, type; Milla to Cristina, *Steyermark* 38655).

Annual(?); culms more or less decumbent-spreading, 15–28 cm. long, pilose with spreading hairs, the nodes retrorsely bearded; sheaths mostly shorter than the nearly equal internodes, papillose-pilose, densely pilose on the collar; ligule ciliate, 0.2–0.4 mm. long; blades 2.5–4.3 cm. long, 5–10 mm. wide, lanceolate, clasping, sparsely pubescent, the margins ciliate nearly to the tip, the uppermost and those of the branches somewhat reduced; panicle 3.3 cm. long, nearly as wide, the slender branches stiffly ascending or spreading, the axis and axils pilose; spikelets 1.5–1.6 mm. long, 0.8 mm. wide, sparsely pilose; first glume 0.5 mm. long, triangular, 1-nerved; second glume and sterile lemma equal, just covering the fruit; fruit 1.4 mm. long, 0.7 mm. wide, elliptic, acute, straw-colored, shining, minutely striate.

Panicum boliviense Hack. Repert. Sp. Nov. Fedde 11: 19. 1912. *P. schiedeanum* Mez, Bot. Jahrb. Engler 56: Beibl. 125: 4. 1921.

River banks and moist or wet thickets, forests, and fields, usually at low altitudes, but occurs up to 1,000 meters; Petén; Alta Verapaz; Izabal; Sololá; Santa Rosa; Escuintla. British Honduras (Temash River); Cuba; southern Mexico (Veracruz) to Argentina.

Perennial; culms as much as 1.5 meters long, decumbent-spreading, rooting at the lower nodes, the nodes glabrous (rarely minutely pubescent); ligule a ciliate

membrane, about 0.5 mm. long; sheaths glabrous or papillose-hispid toward the summit, the margins ciliate or nearly glabrous; blades 5–15 cm. long (rarely to 20 cm.), 7–20 mm. wide, acuminate, cordate at the base, glabrous on both surfaces, the margins very scabrous; panicles 10–25 cm. long, loosely flowered, the branchlets spreading, usually secund on the lower side of the ascending branches; spikelets 1.5–1.6 mm. long, glabrous, the first glume acute, about half the length of the spikelet; fruit 1.4 mm. long, subacute.

Panicum breviramisum Swallen, Contr. U. S. Nat. Herb. 29: 419. 1950.

Known only from pine-clad slopes along stream, vicinity of Nucapuxlac, Huehuetenango, 2,500 meters (*Steyermark* 48948, type).

Perennial(?); culms slender, straggling, branching, about 75 cm. long, glabrous; sheaths mostly shorter than the internodes, glabrous, the collar densely pubescent; ligule an erose membrane 0.2 mm. long; blades 4–10 cm. long, 4–9 mm. wide, acuminate, sparsely papillose-hispid with a tuft of long hairs just above the ligule, the margins scabrous; panicles 4.5–5.5 cm. long, with a few ascending, densely flowered branches, the lowermost 1–1.5 cm. long, scabrous; spikelets 2 mm. long, glabrous; first glume 0.5–1 mm. long; second glume and sterile lemma equal, obtuse, covering the fruit; fruit 1.9 mm. long, 1.2 mm. wide, elliptic, straw-colored, sparsely pilose.

Panicum bulbosum H.B.K. Nov. Gen. & Sp. 1: 99. 1815. *P. avenaceum* H.B.K. Nov. Gen. & Sp. 1: 99. 1815. *P. maximum bulbosum* Vasey in Wheeler, Rep. U. S. Surv. 100th Merid. 6: 295. 1878. *Maiz de cuevo*.

Brushy slopes, about 2,100 meters; Sololá; Chimaltenango. New Mexico; Arizona; Mexico; Colombia; Ecuador.

Perennial; culms as much as 2 meters tall, erect, the lowest internode short, thickened into a hard corm-like base; lower sheaths overlapping, the upper ones shorter than the internodes, usually glabrous; blades 25–60 cm. long, 3–12 mm. wide, scabrous above, glabrous beneath; panicles 20–50 cm. long, the branches relatively stout, ascending or spreading; spikelets 3.5–4.2 mm. long, somewhat crowded on the branchlets; first glume one-half to two-thirds as long as the spikelet, subacute; second glume and sterile lemma subequal, or the glume shorter, exposing the transversely rugose fruit.

Panicum cayennense Lam. Tabl. Encycl. 1: 173. 1791. *P. pedunculare* Willd. ex Steud. Syn. Pl. Glum. 1: 77. 1854. *P. cayennense patulum* Doell in Mart. Fl. Bras. 2 (2): 220. 1877.

Common in wet stream-bed, San Agustín, El Cayo District, British Honduras. Not known from Guatemala. Wet savannas and moist ground along roads and waste places; southern Mexico and the West Indies to Panama and northern South America.

Annual; culms 20–75 cm. high, usually erect, simple or sometimes much branched at the base; sheaths densely papillose-hispid, the hairs ascending or spreading; ligule ciliate, 1–1.5 mm. long; blades 12–20 cm. long, 5–8 mm. wide (smaller in depauperate specimens), linear-lanceolate, sparsely to rather densely papillose-pilose, the margins very scabrous; panicles terminal and axillary, 8–20 cm. long, the branches and branchlets divergent, becoming implicate, few-flowered; spikelets about 2.2 mm. long, obovoid, strongly nerved, the first glume acute, half as long as the spikelet; fruit 1.7 mm. long.

Panicum cayoense Swallen, Contr. U. S. Nat. Herb. 29: 418. 1950.

Limestone hills at San Agustin, Mountain Pine Ridge, El Cayo District, British Honduras (*Lundell* 6809, type).

Perennial; culms apparently erect, 105 cm. high, sparingly branching, densely villous; sheaths densely hispidulous to papillose-hispid, the uppermost smooth, the lower ones longer, the upper ones shorter than the internodes; ligule a ciliate membrane 0.5 mm. long; blades 10–16 cm. long, 15–21 mm. wide, acuminate, softly pubescent, almost velvety, on both surfaces; panicles about 21 cm. long, partly enclosed in the sheath, the branches stiffly ascending, scabrous, bearing short appressed branchlets from near the base; spikelets 2.3–2.5 mm. long, evenly spaced on the branches, not clustered, glabrous; first glume one-fourth as long as the spikelet, broadly acute, nerveless; second glume and sterile lemma subequal, pointed beyond the fruit; fruit 2 mm. long, 1 mm. wide, acutish, densely villous with silky hairs on the palea and margins of the lemma, the back of the lemma glabrous or nearly so.

Panicum chamaelonche Trin. Gram. Pan. 242. 1826.

Pineland; British Honduras (Belize District). Not known from Guatemala. Southeastern United States; Cuba.

Perennial; culms slender, densely tufted, erect or ascending, 8–30 cm. tall, glabrous; ligule very short; blades 3–5 cm. long, 2–3 mm. wide, often involute-pointed; panicles usually 2–3 cm. long, the axis and stiffly spreading branches flexuous; spikelets 1.1 mm. long, long-pedicellate, glabrous. Autumnal phase freely branching, forming dense cushions, the blades much reduced, becoming involute.

Panicum cyanescens Nees ex Trin. Gram. Pan. 202. 1826.

Moist or wet places along streams, margins of ponds, and wet savannas; probably to be found in Guatemala. British Honduras (El Cayo and Belize districts); southern Mexico (Chiapas); Colombia to French Guiana, Peru, and Brazil.

Perennial; culms erect, densely tufted, 30–50 cm. high, simple or sparingly branching, the internodes relatively short, subequal; sheaths about half as long as the internodes; blades 3–6 cm. long, 2–6 mm. wide, glaucous, ascending or appressed, smooth or scaberulous; panicles 4–10 cm. long, as much as 10 mm.

wide; spikelets 1.5 mm. long, subglobose, glabrous, the first glume rounded or subacute, about two-thirds as long as the spikelet.

***Panicum elephantipes* Nees ex Trin. Gram. Pan. 206. 1826.**

In water, near mouth of Río Polochic, Alta Verapaz. West Indies; Colombia to British Guiana, Brazil, and northern Argentina.

Succulent aquatic perennial; culms elongate, decumbent-spreading, rooting at the nodes, as much as 2 cm. thick, the lower internodes relatively short, subequal; sheaths inflated, glabrous; ligule a dense line of hairs 1–2 mm. long; blades flat, elongate, 5–20 mm. wide, acuminate, scabrous above; panicles as much as 40 cm. long, nearly as broad at maturity, the branches elongate with short, appressed branchlets; spikelets 4–5 mm. long, glabrous; first glume triangular, acute, about one-fourth as long as the spikelet; second glume and sterile lemma equal, acuminate, as long as the acuminate fruit.

***Panicum fasciculatum* Swartz, Prodr. Veg. Ind. Occ. 22. 1788.**

P. chartaginense Swartz, Prodr. Veg. Ind. Occ. 22. 1788. *P. fuscum* Swartz, Prodr. Veg. Ind. Occ. 23. 1788. *P. reticulatum* Griseb. Abh. Wiss. Gott. 7: 264. 1857.

Moist ground, fields, and waste places; Petén; Alta Verapaz; Izabal; Zacapa; Escuintla; Sololá; Huehuetenango; undoubtedly to be found in other departments. Florida; Texas; Mexico and the West Indies to Ecuador and Brazil.

Annual; culms slender, branching, erect or decumbent at the base, glabrous or papillose-hispid, 15 cm. to as much as 1 meter long; sheaths papillose or papillose-hispid, especially on the margins; blades 5–25 cm. long, 0.5–2 cm. wide, glabrous or scaberulous, the margins scabrous; panicles 3–15 cm. long, rather dense, the branches ascending to spreading; spikelets 2.5–3 mm. long, dark brown, often tinged with purple, glabrous, the second glume and sterile lemma prominently reticulate-veined; fruit pale, strongly transversely rugose, acute.

Panicum frondescens* Meyer, Prim. Fl. Esseq. 56. 1818. *P.

stoloniferum major Kunth, Rév. Gram. 2: 389. 1831. *P. kegelii* Steud. Syn. Pl. Glum. 1: 65. 1854. *Hymenachne frondescens* Fourn. Mex. Pl. 2: 36. 1886.

Moist ground in open forests, forest margins, and river banks; Petén. British Honduras; southern Mexico; Lesser Antilles; Costa Rica to northern Argentina.

Perennial; culms slender, ascending from a decumbent base, rooting at the nodes, branching, sparsely pilose, 15–60 cm. long; sheaths much shorter than the internodes, ciliate, more or less pilose in the throat, pubescent across the back on the collar; blades lanceolate, acuminate, mostly 5–11 cm. long, 8–15 mm. wide, narrowed at the more or less petiolate base, glabrous or minutely pubescent, the margins scabrous; panicles 4–11 cm. long, the usually numerous crowded

densely flowered racemes 5–25 mm. long, finally spreading or even reflexed; spikelets about 2.7 mm. long, crowded, spreading, glabrous, the first glume acute, about one-third as long as the spikelet; fruit 1.5–1.6 mm. long, short-stipitate.

Panicum furtivum Swallen, Contr. U. S. Nat. Herb. 29: 421. 1950.

Thickets. Known only from the Sierra de los Cuchumatanes, between Quetzal and Barillas, Huehuetenango, 1,600–2,000 meters (*Steyermark* 49123, type).

Perennial; culms erect from a decumbent base, about 30 cm. long, papillose-pilose, the upper part of the internodes glabrous or nearly so; sheaths longer or shorter than the internodes, pilose or papillose-pilose, especially along the margins and on the collar; ligule ciliate, about 0.5 mm. long; blades 3.5–4.5 cm. long, rarely less, 6–12 mm. wide, ovate-lanceolate, acute, softly pubescent on both surfaces, the whitish margins finely scabrous, papillose-ciliate toward the rounded subcordate base; panicle 5 cm. long, about 4 cm. wide, partly enclosed in the elongate upper sheath, the branches rather widely ascending, glabrous, more or less glandular-spotted; spikelets 2–2.1 mm. long, 1 mm. wide, glabrous or very sparsely pilose, tinged with purple; first glume one-third as long as the spikelet, triangular, broadly acute or subobtuse; second glume and sterile lemma obtuse, as long as the fruit, or the glume a little shorter, exposing the tip of the fruit; fruit 1.8 mm. long, 1 mm. wide, broadly elliptic, subacute, minutely striate.

Panicum furvum Swallen, Contr. U. S. Nat. Herb. 29: 416. 1950.

Known only from the Sierra de los Cuchumatanes, between Nenton and Las Palmas, Huehuetenango, 800–1,200 meters (*Steyermark* 51627, type).

Perennial; culms densely tufted, erect, 10–21 cm. high, glabrous, or sparsely pilose near the bearded nodes; leaves mostly crowded at the base, one on the mid-culm; sheaths rounded, glabrous, or with a few long hairs toward the base; ligule ciliate, about 0.5 mm. long; blades 2–6.5 cm. long, 2–4 mm. wide, glabrous, sparsely papillose-ciliate toward the base; panicles 3.5–6 cm. long, long-exserted, the branches narrowly ascending, the lowermost about 3 cm. long; spikelets 1.5–1.6 mm. long, glabrous, pale, tinged with purple; first glume 1.3–1.5 mm. long, acute, broadly triangular, clasping, strongly 5-nerved; second glume and sterile lemma subequal or the sterile lemma a little longer, gaping, strongly 5-nerved; fruit 1.6 mm. long, elliptic, acute, dark brown, smooth and shining.

Panicum fusiforme Hitchc. Contr. U. S. Nat. Herb. 12: 222. 1909.

Sandy pine woods; British Honduras (Belize, Toledo, and El Cayo districts). Not known from Guatemala. Southeastern United States; Cuba; Jamaica.

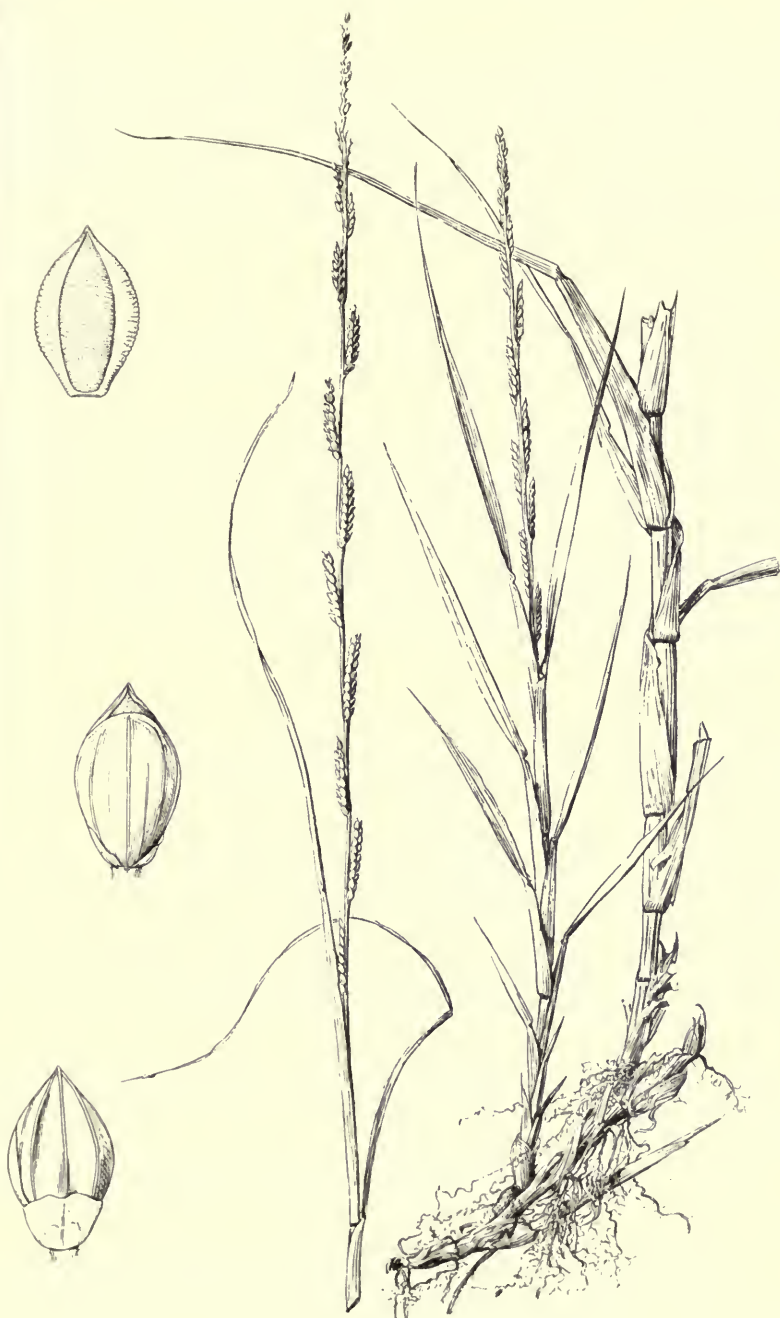


FIG. 75. *Panicum geminatum*. Plant, $\times \frac{1}{2}$; two views of spikelet, and floret, $\times 10$.

Perennial; culms tufted, erect or ascending, 30–50 cm. tall, the lower internodes softly hairy; blades 6–15 cm. long, 2–4 mm. wide, acuminate, narrowly ascending, glabrous or nearly so; panicle branches rather short, stiffly ascending; spikelets 3–3.5 mm. long, fusiform, papillose-villous; first glume about 1.5 mm. long, obtuse or subacute; second glume and sterile lemma nearly equal, exceeding the fruit. Autumnal culms becoming branched and somewhat top-heavy, the blades soon involute, the panicles reduced, partly hidden in the leaves.

Panicum geminatum Forsk. Fl. Aegypt. Arab. 18. 1775.
Figure 75.

Wet ground, ditches, often floating in margins of lakes at low altitudes; Izabal; Jutiapa; Zacapa; Escuintla. Tropical regions of both hemispheres.

Perennial; culms caespitose, spreading from a decumbent base, 25–85 cm. long, succulent at least toward the base, smooth, shining; sheaths longer than the internodes, more or less inflated; ligule ciliate, about 1 mm. long; blades 10–20 cm. long, 3–6 mm. wide, flat or loosely rolled, glabrous on the lower surface, scaberrulous on the upper, the margins glabrous or scabrous; panicle 12–30 cm. long with 12–18 rather short erect or ascending racemes; spikelets 2–2.5 mm. long, about 1.5 mm. wide, acute, the first glume 0.5 mm. long, clasping, truncate; fruit strongly transversely rugose.

Panicum glutinosum Swartz, Prodr. Veg. Ind. Occ. 24. 1788.

A roadside weed at Cobán, Alta Verapaz. Southern Mexico; Costa Rica; Honduras; West Indies; Colombia to Brazil and Argentina. A common forest grass in tropical America.

Perennial; culms coarse, erect or decumbent at the base, sometimes stolon-like, compressed, glabrous, as much as 2 meters long; sheaths usually longer than the internodes, glabrous or sometimes pilose, densely villous on the collar; blades 15–50 cm. long, 15–25 mm. wide, acuminate, narrowed toward the base, glabrous or sparsely pilose; panicles 15–30 cm. long, the verticillate branches ascending, usually naked below, the branchlets and pedicels appressed; spikelets 3–3.5 mm. long, obtuse, viscid; first and second glumes subequal, obtuse, a little shorter than the spikelet; sterile lemma about as long as the fruit.

Panicum grande Hitchc. & Chase, Contr. U. S. Nat. Herb. 17: 529. f. 143. 1915. *P. myrianthum* Mez, Bot. Jahrb. Engl. 56: Beibl. 125: 3. 1921.

Swamps and swampy openings in woods, Izabal (Lago Izabal). Honduras; Nicaragua; Costa Rica; Panama; Trinidad; Colombia; Venezuela; Surinam; Brazil (Matto Grosso).

Stoloniferous perennial; culms 1.5–2 meters high, erect from a long decumbent base, 1–2 cm. thick, simple or sparingly branched, the nodes densely appressed-hirsute; sheaths mostly longer than the internodes, papery or somewhat succulent, sparsely hispid at the throat; ligule membranaceous, about 2 mm. long; blades of the midculm as much as 1 meter long, 6 cm. wide, the upper and lower ones

smaller, the margins serrulate; panicles 30–60 cm. long, 10–40 cm. wide, the axis rather deeply furrowed, the branches stiffly ascending, naked at the base, the lower ones whorled, mostly 20–30 cm. long; spikelets 2.5 mm. long, short-pedicellate, appressed to the branchlets, pointed, glabrous, the first glume acute, a little more than half as long as the spikelet; fruit 1.8 mm. long, obovate, smooth and shining.

Panicum guatemalense Swallen, Jour. Washington Acad. Sci. 23: 460. 1933.

Known only from Guatemala, the type from Santa María, Quezaltenango, *Weatherwax* 1689.

Perennial; culms more than 75 cm. tall, scaberulous, sparsely papillose-pilose, much branched above; sheaths glabrous, papillose or papillose-pilose, those of the main culm much shorter than the internodes, those of the branches overlapping, the collar densely pubescent; blades flat, 7–12 cm. long, 4–10 mm. wide, scaberulous, more or less papillose or papillose-pilose, densely pilose on the upper surface at the very base, the white-cartilaginous margins distinctly scabrous; ligule membranaceous, about 0.2 mm. long; panicle 10 cm. long, the branches ascending or appressed, spikelet-bearing from the very base or nearly so; spikelets glabrous, 2.2–2.4 mm. long, appressed, the pedicels shorter than the spikelets; first glume obtuse, 0.5–1 mm. long; second glume and sterile lemma equal, enclosing the fruit; fertile lemma 2 mm. long, shining, sparsely hairy toward the summit.

Panicum hians Ell. Bot. S. C. & Ga. 1: 118. 1816. *P. oblongiflorum* Desv. Opusc. 89. 1831. *P. jejunum* Trin. Mém. Acad. St. Pétersb. VI. Sci. Nat. 2 (1): 103. 1836.

Known in Guatemala only from the vicinity of Jalapa, Dept. Jalapa, at about 1,360 meters, *Standley* 76607. Ditches, along streams and lakes, and on wet savannas, southeastern United States; southern Mexico; Honduras; Panama.

Perennial; culms tufted, simple or sparingly branching, erect or geniculate and rooting at the lower nodes, as much as 70 cm. tall; sheaths shorter than the internodes, keeled, glabrous; blades 5–15 cm. long, 1–5 mm. wide, glabrous, or pilose on the upper surface toward the base; panicles 5–20 cm. long, the slender, rather distant branches ascending or finally spreading or drooping, usually naked in the lower half; spikelets 2.2–2.4 mm. long, clustered on the short appressed branchlets, glabrous; first glume acute, about half as long as the spikelet; second glume and sterile lemma subequal, about as long as the fruit, the sterile palea becoming enlarged and indurate, expanding the spikelet.

Panicum hirsutum Swartz, Fl. Ind. Occ. 1: 173. 1797.

Moist ground or swamps near sea level; found in Guatemala only on sandy seashore around Punta Palma, Izabal. West Indies; southern Mexico to Ecuador; Brazil (Pará).

Perennial; culms robust, erect, 1–1.5 meters or more high; the nodes densely appressed-pubescent; sheaths papillose or papillose-pilose, somewhat inflated; ligule 4–5 mm. long, densely ciliate; blades 30–60 cm. long, 1.5–4 cm. wide, glabrous or nearly so on both surfaces, the margins scabrous-serrate; panicles as much as 45 cm. long, the branches narrowly ascending or somewhat spreading, densely flowered, naked toward the base; spikelets 2 mm. long, acute, glabrous, the first glume acute or subobtusate, about half as long as the spikelet.

Panicum hirticaule Presl, Rel. Haenk. 1: 308. 1830. *P. flabellatum* Fourn. Bull. Soc. Bot. France II. 27: 293. 1880.

Dry ground, along railroads, and in waste places; Izabal; Zacapa. Cuba; Haiti; Mexico to Panama and western South America to Argentina.

Annual; culms 10–70 cm. tall, in small erect or ascending tufts, sparingly branched, papillose-hispid, especially below the nodes; sheaths usually a little shorter than the internodes, conspicuously papillose-hispid with spreading hairs; ligule ciliate, about 1 mm. long; blades 8–25 cm. long, 4–10 mm. wide, lanceolate, subcordate, sparsely to rather densely papillose-hispid, the margins scabrous and often papillose-hispid-ciliate; panicles 5–15 cm. long, usually brown, the rather slender ascending branches naked in the lower half; spikelets 2.5–3.3 mm. long, acuminate or abruptly pointed, the first glume acute, one-half to two-thirds as long as the spikelet; fruit 1.8–2 mm. long, smooth and shining.

Panicum hirtum Lam. Encycl. 4: 741. 1798.

Moist shady places in forests, British Honduras (Toledo and Belize districts). Not known from Guatemala. Mexico (Oaxaca); Trinidad; Colombia; Venezuela; British Guiana; Ecuador; Brazil.

Annual; culms appressed-pilose, becoming decumbent-spreading, rooting at the nodes, the branches erect or ascending, 15–30 cm. long; sheaths much shorter than the internodes, pilose; blades thin, cordate, 2–6 cm. long, 8–15 mm. wide, sparsely pilose, the margins scabrous, papillose-ciliate toward the base; panicles 5–7 cm. long, pyramidal, the branches spreading; spikelets 1.2–1.4 mm. long, obliquely placed on the pedicels, papillose-hirsute, the hairs spreading.

Panicum ichnanthoides Fourn. Mex. Pl. 2: 30. 1886.

Dry sandy ground and rocky hillsides. British Honduras (Belize District). Southern Mexico; Nicaragua.

Perennial; culms in large clumps, 1.5–2 meters tall, erect or decumbent at the base, smooth and hard; sheaths shorter than the internodes, pubescent on the margins; blades flat, elongate, 8–15 mm. wide, the upper surface scabrous, sometimes villous at the base; panicle 20–40 cm. long, the long slender branches ascending, naked at the base; spikelets 3.5–4.2 mm. long, glabrous; first glume acuminate, more than half as long as the spikelet; second glume and sterile lemma unequal, longer than the fruit, the glume acuminate, the lemma acute.

Panicum incumbens Swallen, Contr. U. S. Nat. Herb. 29: 417. 1950.

Known only from cloud forest on top of Cerro Tixixí, Chiquimula, about 1,500 meters (*Steyermark* 31573, type).

Perennial; culms 85 cm. long, decumbent-spreading, sparingly branching, rather sparsely appressed-pilose; sheaths all longer than the internodes, papillose or papillose-hispid with spreading hairs; ligule membranaceous, ciliate, about 0.5 mm. long; blades 13–22 cm. long, 9–18 mm. wide, acuminate, scabrous above, nearly smooth beneath, with thickened, white, sharply serrate-scabrous margins; panicle 6 cm. long, few-flowered, the branches stiffly ascending, the axis and branches scabrous and pilose; spikelets 2.9–3 mm. long, elliptic, acute, glabrous; first glume one-sixth to one-third as long as the spikelet, subacute, nerveless; second glume and sterile lemma equal, 5–7-nerved, slightly longer than the fruit; fruit 2.6 mm. long, striate, very minutely transversely veined, rather densely silky-villous.

Panicum lancearium Trin. Gram. Pan. 223. 1826.

Pine ridges, British Honduras (Belize District). Not known from Guatemala. Southeastern United States; Cuba; Dominican Republic.

Perennial; culms densely tufted, erect, 20–50 cm. high, minutely puberulent; blades 2–6 cm. long, 3–7 mm. or commonly 4–5 mm. wide, usually glabrous above, the white margins scabrous; panicles 3–6 cm. long; spikelets 2–2.1 mm. long, asymmetrically pyriform, pubescent or sometimes glabrous; first glume obtuse, clasping, smooth and shining. Autumnal culms geniculate-spreading, branching from the middle and upper nodes, the branches, panicles, and blades crowded, much reduced.

Panicum laxum Swartz, Prodr. Veg. Ind. Occ. 23. 1788.

Forests, brushy slopes, swampy meadows, margins of swamps, and open banks, usually in moist places, from sea level to about 1,350 meters; Petén; Alta Verapaz; Izabal; Zacapa; Chiquimula; Jutiapa; Santa Rosa. British Honduras; Mexico and the West Indies to Paraguay.

Perennial; culms geniculate-ascending or decumbent at the base and rooting at the nodes, 15–100 cm. long, branching, glabrous; sheaths mostly shorter than the internodes, nearly glabrous to papillose or papillose-hispid, especially near the summit, with a dense pubescent line on the collar, the margins usually densely ciliate; blades mostly 5–12 cm. long, sometimes longer, 5–10 mm. or rarely to 15 mm. wide, rounded or subcordate at the base, the lower surface nearly smooth, the upper scaberrulous, sometimes sparsely pilose, the margins usually scabrous; panicle 5–30 cm. long, composed of several to many slender raceme-like branches, the lower ones rather distant, spreading, the upper ascending, successively shorter; branchlets secund on the lower side of the branches, densely flowered; spikelets 1–1.5 mm. long, the first glume about half as long.

Panicum lepidulum Hitchc. & Chase, Contr. U. S. Nat. Herb. 15: 75. f. 64. 1910.

Cornfield, Guatemala (Guatemala City). Mexico.

Perennial; culms in small tufts, erect, 25–70 cm. tall, simple or sparingly branching at the lower nodes; sheaths papillose-hispid with ascending hairs, mostly longer than the internodes; blades 7–30 cm. long, 5–10 mm. wide, flat, sparsely papillose-pilose or nearly glabrous; terminal panicles long-exserted, as much as 20 cm. long, the branches ascending, somewhat flexuous, the spreading branchlets bearing a few spikelets toward the ends; spikelets 4–4.2 mm. long, turgid, acuminate, glabrous, the first glume acuminate, about half as long as the spikelet.

Panicum longiligulatum Nash, Bull. Torrey Club 26: 574. 1899.

Sandy pine woods, British Honduras (Belize District). Not known from Guatemala. Southeastern United States; Dominican Republic.

Perennial; culms 30–70 cm. tall, slender or rather stout, erect or ascending; ligule 3 mm. long; blades 4–8 cm. long, 4–8 mm. wide, glabrous above, minutely pubescent beneath; panicles 3–8 cm. long, the branches rather densely flowered, ascending or spreading; spikelets 1.2 mm. long, pubescent; first glume about one-third the length of the spikelet, subacute. Autumnal culms spreading or reclining with usually numerous, rather crowded, reduced blades and panicles.

Panicum lundellii Swallen, Jour. Washington Acad. Sci. 28: 9. 1938.

Wet alluvial lowland, along Mahogany Creek, Mountain Pine Ridge, El Cayo District, British Honduras (*Lundell* 6903, type).

Perennial, glaucous; culms coarse, erect, 2.5–3 meters tall, as much as 9 mm. thick at the base, producing short rhizomes, glabrous; sheaths glabrous, or the margins ciliate, mostly a little shorter than the long internodes, deeply tinged with purple, especially near the nodes; ligule ciliate, about 2 mm. long; blades firm, flat, narrowed toward the base, attenuate-pointed, 40–70 cm. long, 15–20 mm. wide, glabrous, the margins hispid-serrate; panicle about 35 cm. long, the branches narrowly ascending, naked in the lower half, as much as 15 cm. long; pedicels terete, glabrous, 1–5 mm. long; spikelets 4–4.5 mm. long, glabrous, usually tinged with purple; first glume rather abruptly acute or acuminate, 2.5–3 mm. long, 3-nerved; second glume abruptly acuminate, 4–4.5 mm. long, 5-nerved; sterile lemma 3–3.5 mm. long, acute, 5–7-nerved, the nerves rather obscure especially toward the base; fruit (immature) 2.5 mm. long, 0.9 mm. wide, elliptic, blunt, whitish.

Panicum maximum Jacq. Coll. Bot. 1: 76. 1786. *P. polygamum* Swartz, Prodr. Veg. Ind. Occ. 24. 1788. *P. laeve* Lam. Tabl. Encycl. 1: 172. 1791. *P. jumentorum* Pers. Syn. Pl. 1: 83. 1805.

P. trichocondylum Steud. Syn. Pl. Glum. 1: 74. 1854. *Zacate; Zacatón; Guinea grass.* Figure 76.

Fields and waste places, much cultivated for forage and escaping up to 1,500 meters or more; Alta Verapaz; Izabal; Jutiapa; Chiquimula; Jalapa; Escuintla; Guatemala; Quezaltenango. Florida; West Indies; Mexico to Ecuador and Brazil. Africa.

Perennial with stout rhizomes; culms usually in large clumps, 1–2.5 meters high, erect or sometimes geniculate at the lower nodes, the nodes usually densely hirsute; sheaths shorter than the internodes, papillose-hirsute or nearly glabrous; ligule 4–6 mm. long, densely ciliate; blades elongate, 1–2 cm. wide, narrowed toward the base, the margins very scabrous; panicles 20–45 cm. long, the branches in rather distant whorls, ascending or spreading, somewhat drooping at maturity, naked toward the base, pilose in the axils; spikelets 3 mm. long, acute, glabrous, the first glume obtuse, about one-third as long as the spikelet; fruit 2.3–2.5 mm. long, transversely rugose.

This is a very important forage grass in tropical countries. It is rather variable in size and habit, but the different forms are scarcely worthy of varietal rank. A native of Africa very early introduced in America.

Panicum milleflorum Hitchc. & Chase, Contr. U. S. Nat. Herb. 17: 494. *f.* 70. 1915.

Swamps. British Honduras (Manatee River, Belize District); Panama to Brazil.

Perennial; culms erect or sometimes geniculate, as much as 2 meters high, glabrous, the nodes pubescent; sheaths shorter than the internodes, sparsely to rather densely papillose-pilose, densely pubescent on the collar; ligule obsolete or nearly so; blades acuminate, 15–35 cm. long, 12–20 mm. wide, sparsely pilose, the margins scabrous; panicles 25–45 cm. long, the axis papillose-pilose, the lower branches in rather distant fascicles, ascending, with numerous short branchlets, the upper ones simple, spreading; spikelets 1.3 mm. long.

Panicum molle Swartz, Prodr. Veg. Ind. Occ. 22. 1788.

Dry or moist, usually open ground, fields, and waste places; Baja Verapaz; Izabal; Zacapa. Central Mexico and the West Indies to Argentina.

Annual; culms 15–75 cm. long, erect or ascending, often geniculate and rooting at the lower nodes, finely pubescent or pilose, especially below the densely pubescent nodes; sheaths softly pubescent, usually shorter but often longer than the internodes; ligule ciliate, about 1 mm. long; blades 5–25 cm. long, 6–20 mm. wide, or sometimes those of the branches smaller, softly pubescent on both surfaces, the white firm margins scabrous; panicles 5–12 cm. long, the main axis and rachis of the narrowly ascending racemes densely pubescent; spikelets 3.5–4 mm. long, rather dense, usually brown or tinged with purple, abruptly pointed, densely



FIG. 76. *Panicum maximum*. Plant, $\times \frac{1}{2}$; two views of spikelet, and floret, $\times 10$.

pubescent, the first glume broad, acute, one-half to three-fourths as long as the spikelets; fruit 2.5–3 mm. long, acute or apiculate, finely transversely rugose.

***Panicum neuranthum* Griseb. Cat. Pl. Cub. 232. 1866.**

Edge of creek, near Salt Creek, British Honduras (*O'Neill* 8454). Not known from Guatemala. Southeastern United States; Bahamas; Cuba.

Similar to *P. arenicoloides*; plants glabrous or nearly so; panicles 5–9 cm. long, the branches narrowly ascending, the branchlets appressed; spikelets 2 mm. long, obovate, the first glume about one-third as long as the spikelet; second glume and sterile lemma equal, about as long as the fruit. Autumnal phase with erect culms, the blades involute, not much reduced.

***Panicum nitidum* Lam. Tabl. Encycl. 1: 172. 1791. *P. dichotomum nitidum* Wood, Class-book ed. 3. 786. 1861. *P. multirameum* Scribn. U. S. Dept. Agr. Div. Agrost. Circ. 19: 2. 1900. *P. subbarbulatum* Scribn. & Merr. U. S. Dept. Agr. Div. Agrost. Circ. 29: 9. 1901.**

Swamps and open banks, 1,300–1,350 meters; Alta Verapaz. Southeastern United States; southern Mexico; Bahamas; Cuba; Dominican Republic; Jamaica.

Perennial; culms at first erect, 30 cm. to as much as 1 meter long, the nodes retrorsely bearded; sheaths much shorter than the internodes, usually glandular-mottled; blades 5–12 cm. long, 5–10 mm. wide, glabrous, hispid-ciliate at the rounded base; panicles 5–8 cm. long, the axis and branches viscid-spotted, the branches ascending or spreading, often implicate; spikelets 2 mm. long, pubescent, the first glume one-fourth to one-third as long as the spikelet. Autumnal phase with long branches from the lower and middle nodes, these often repeatedly branched forming flabellate clusters, the blades and panicles much reduced.

The three specimens from Guatemala (*Standley* 92838, *Steyermark* 43942, and *Tuerckheim* II 1322) have been referred heretofore to *P. multirameum* Scribn., along with specimens from southern Mexico. The type of *P. multirameum* was collected on dry hills, near Jalapa, Veracruz, Mexico (*Pringle* 7882). It is a plant in the autumnal phase with rather dense, clustered branches, the character used to distinguish this species from *P. nitidum*. The character is probably a result of the habitat or conditions under which the plant was growing. There are no other correlated characters.

***Panicum olivaceum* Hitchc. & Chase, Contr. U. S. Nat. Herb. 15: 225. f. 234. 1910.**

Open pine woods, thickets, and roadsides, mostly 1,000–2,000 meters; Alta Verapaz; Izabal; Huehuetenango. British Honduras (Toledo and El Cayo districts); southern Mexico to Venezuela.

Perennial; culms 20–40 cm. high, erect or spreading at the base, softly appressed-villous, the nodes bearded; sheaths mostly shorter than the internodes, velvety-pilose with spreading hairs; ligule ciliate, 3–4 mm. long; blades 4–7 cm. long, 5–8 mm. wide, the uppermost reduced, stiffly ascending or spreading, rather densely softly pubescent on the lower surface, pubescent or villous on the upper, the margins scabrous; panicles 3–7 cm. long, the axis pilose; spikelets 1.9–2 mm. long, pubescent, the first glume subacute, one-fourth to one-third as long as the spikelet; fruit 1.6 mm. long. Autumnal phase decumbent-spreading, freely branching from the upper and middle nodes, the reduced branches appressed, the blades 1–2 cm. long, 2–4 mm. wide.

Panicum paludivagum Hitchc. & Chase, Contr. U. S. Nat. Herb. 15: 32. f. 13. 1910.

Edges of swamps and lake shores; Alta Verapaz (Panzos); Sacatepéquez (Laguna Amatitlán); Izabal (Lago Izabal). Florida; Texas; Mexico (Jalisco and Michoacán); Brazil (Rio Grande do Sul); Uruguay; Paraguay; Argentina.

Succulent, aquatic perennial; culms creeping at the base, rooting at the nodes, branching, as much as 2 meters long; sheaths somewhat inflated, papery, glabrous; blades 15–40 cm. long, acuminate, conduplicate at the base, scabrous above; panicles 15–35 cm. long, the racemes erect, the lower ones distant, as much as 3 cm. long; spikelets 2.8–3 mm. long, appressed, ovate, acute, glabrous; first glume about one-fourth as long as the spikelet, truncate, nerveless, papery; second glume obtuse, one-half to two-thirds as long as the spikelet; sterile lemma acute, about as long as the fruit; fruit acute, more or less rugose.

Panicum pampinosum Hitchc. & Chase, Contr. U. S. Nat. Herb. 15: 66. f. 48. 1910.

Brushy or rocky slopes, up to about 900 meters; Zacapa; Chiquimula; Jutiapa. New Mexico and Arizona; Mexico (Sonora; Chihuahua; Durango; Guanajuato; Puebla).

Annual; similar in habit to *P. hirticaule* Presl; culms as much as 40 cm. tall, usually shorter; panicles long-exserted, 6–15 cm. long, the branches solitary, relatively stout, very stiffly ascending; spikelets 4–4.5 mm. long, glabrous; first glume usually more than three-fourths as long as the spikelet, acute or acuminate; second glume and sterile lemma acuminate, much exceeding the fruit; fruit 2.2 mm. long.

Panicum parcum Hitchc. & Chase, Contr. U. S. Nat. Herb. 15: 68. 1910.

Damp thickets; region of El Tablón, Jutiapa, 850–900 meters. Central Mexico; Nicaragua.

Annual; culms usually erect, 20–100 cm. tall, simple or sparingly branching, glabrous; sheaths papillose-hispid to nearly glabrous; blades linear, 10–30 cm. long, 2–8 mm. wide, flat, papillose-hispid, the margins ciliate; panicles as much

as 40 cm. long, rather fragile, the long, more or less flexuous branches solitary or sometimes in pairs, ascending, the secondary branchlets bearing one or two spikelets; spikelets 5–6 mm. long, glabrous; first glume acuminate, about half as long as the spikelet; second glume longer than sterile lemma, acuminate, both exceeding the fruit.

Panicum parvifolium Lam. Tabl. Encycl. 1: 173. 1791.

River banks, margins of ponds, and wet open places; British Honduras (El Cayo District). Not known from Guatemala. Costa Rica; West Indies; Venezuela to Surinam, Brazil, and Argentina (Misiones). Africa.

Perennial; culms very slender, freely branching, decumbent at the base and rooting at the lower nodes; sheaths much shorter than the internodes, pilose with stiffly ascending or spreading hairs; blades glaucous, mostly 1.5–2.5 cm. long, 2–4 mm. wide, often pilose; panicles 2–4 cm. long, nearly as broad, the branches spreading, rather few-flowered; spikelets long-pedicellate, 1.5 mm. long, the first glume broad, subacute, two-thirds as long as the spikelet.

Panicum parviglume Hack. Oesterr. Bot. Zeitschr. 51: 429. 1901.

Damp forests, openings in forest, occasionally in open places, mostly 1,400–2,000 meters; Chiquimula; Guatemala; Quezaltenango. British Honduras; southern Mexico; Costa Rica.

Perennial; culms erect or ascending, as much as 1 meter tall, papillose-pilose; sheaths usually longer than the internodes, papillose-pilose or papillose-hispid, densely so on the collar; blades lanceolate, acuminate, usually pubescent or pilose, strongly scabrous on the upper surface and on the margins; panicles 12–25 cm. long, the branches rather stiffly ascending, scabrous, the lower ones naked in the lower half, the branchlets appressed; spikelets 2 mm. long, glabrous; first glume one-fifth to one-fourth as long as the spikelet; second glume and sterile lemma equal, somewhat pointed beyond the fruit.

Panicum patulum (Scribn. & Merr.) Hitchc. Rhodora 8: 209. 1906. *P. nashianum patulum* Scribn. & Merr. U. S. Dept. Agr. Div. Agrost. Circ. 27: 9. 1900. *P. lancearium* var. *patulum* Fernald, Rhodora 36: 80. 1934.

Tropical pineland, near Boomtown, Belize District, British Honduras (O'Neill 8430). Not known from Guatemala. South-eastern United States; Hispaniola.

Perennial; similar to *P. lancearium*; culms more slender, usually geniculate-decumbent, 10–50 cm. long; blades lax and rather thin, pubescent on both surfaces or obscurely pubescent above; spikelets thicker, the second glume and sterile lemma densely papillose-pubescent. Autumnal phase freely branching from all the nodes, the blades and panicles much reduced.

Panicum pilosum Swartz, Prodr. Veg. Ind. Occ. 22. 1788. *P. distichum* Lam. Encycl. 4: 731. 1798. *P. trichophorum* Schrad. ex Schult. Mant. 2: 247. 1824. *P. densiflorum* Willd. ex Spreng. Syst. Veg. 1: 320. 1825.

Swamps, lake shores, wet open ground and open woods, sometimes a weed in gardens and along roadsides, at low altitudes up to 350 meters; Petén; Alta Verapaz; Izabal; Suchitepéquez; probably also occurs in other departments. Mexico and the West Indies to Argentina.

Perennial; culms erect or decumbent at the base and rooting at the lower nodes, 25–60 cm. or sometimes as much as 1 meter long, branching, the nodes bearded or sometimes nearly glabrous; sheaths longer than the internodes, the margins papillose-ciliate at least toward the summit; ligule wanting; blades lanceolate, 5–20 cm. long, 6–10 mm. wide (rarely as much as 15 mm.), widest at the cordate base, glabrous on the lower surface, sparsely hispid on the upper, the margins scabrous; panicles erect, 8–15 cm. long, the branches simple, 1–4 cm. long, usually stiffly and abruptly spreading, the rachis papillose-hispid, the hairs sometimes sparse; spikelets 1.3–1.5 mm. long, crowded.

Panicum polycaulon Nash, Bull. Torrey Club 24: 200. 1897.

In tropical pineland, three miles west of Boomtown, Belize District, British Honduras (O'Neill 8480). Not known from Guatemala. Florida; Alabama; Mississippi; Cuba; Puerto Rico.

Very similar to *Panicum strigosum* and easily confused with it; panicle axis and branches less conspicuously hairy; spikelets larger, 1.5–1.6 mm. long, more obovate.

Panicum polygonatum Schrad. in Schult. Mant. 2: 256. 1824. *Setaria polygonata* Kunth, Rév. Gram. 1: 47. 1829. *P. pilosum polygonatum* Doell in Mart. Fl. Bras. 2(2): 211. 1877. *P. bourgaei* Fourn. Mex. Pl. 2: 25. 1886.

Moist river banks, lake shores, and openings in forests; sometimes a weed in cultivated places; Alta Verapaz; Izabal. British Honduras (Toledo and El Cayo districts); southern Mexico to Paraguay.

Perennial; culms slender, widely decumbent-spreading, branching, the nodes pubescent, rooting at the lower nodes, the internodes usually rather short; sheaths shorter than the internodes, glabrous, the margins ciliate; ligule about 0.3 mm. long, membranaceous, erose; blades rather thin, cordate, mostly 5–8 cm. long, 5–10 mm. (rarely 15 mm.) wide, glabrous or sparsely pilose; panicles 6–15 cm. long, the usually numerous branches ascending, the branchlets appressed or spreading, mostly on the lower side of the branches; spikelets 1.5 mm. long, glabrous.

Panicum pseudopubescens Nash, Bull. Torrey Club 26: 577. 1899. *P. villosissimum* var. *pseudopubescens* Fernald, Rhodora 36: 79. 1934.

Dry oak woods, about Laguna de Ocubilá, east of Huehuetenango, Dept. Huehuetenango, about 1,900 meters (*Standley* 82670). Eastern United States.

Similar to *P. villosissimum*; culms stiffer; hairs on the culms and sheaths shorter, ascending or appressed; blades firmer, less densely hairy on the upper surface; spikelets 2.2–2.4 mm. long. Autumnal phase stiffly spreading, branching from the lower and middle nodes.

Panicum pulchellum Raddi, Agrost. Bras. 42. 1823. *P. leptostachyum* Presl, Rel. Haenk. 1: 311. 1830. *Hymenachne leptostachya* Fourn. Mex. Pl. 2: 36. 1886. *Almari* (Izabal).

Moist or wet thickets, brushy slopes and forests, rarely in open ground, up to about 1,400 meters; Petén; Alta Verapaz; Izabal; Santa Rosa; Quezaltenango. British Honduras; Martinique; southern Mexico to Bolivia and Brazil.

Perennial, though often appearing like an annual; culms 15–75 cm. long, slender, rather delicate, decumbent at the base and rooting at the lower nodes, the branches ascending or erect, the nodes pubescent; sheaths much shorter than the internodes, more or less pilose, the margins ciliate; blades thin, ovate-lanceolate, asymmetrical, subcordate, 1.5–5 cm. long, 8–18 mm. wide, pilose or nearly glabrous; panicles 3–14 cm. long, the racemes 5–15 mm. long, rather stiffly spreading or reflexed, rather distant or approximate; spikelets 2 mm. long, turgid, pilose, the hairs longer near the margins; first glume acute, about one-third the length of the spikelets, the sterile lemma with two conspicuous crateriform glands; fruit 1.3 mm. long.

Panicum purpurascens Raddi, Agrost. Bras. 47. 1823. *P. barbinode* Trin. Mém. Acad. St. Pétersb. VI. Sci. Nat. 1: 256. 1834. Figure 77.

Moist or wet ground, sometimes growing in water, usually at low altitudes; Jutiapa; Escuintla; San Marcos. British Honduras; throughout tropical and subtropical America.

Stoloniferous perennial; culms as much as 6 meters long, coarse, decumbent at the base and rooting at the lower nodes, often geniculate, the nodes densely villous; sheaths mostly longer than the internodes, papillose or papillose-pilose, densely pubescent on the collar; ligule ciliate, 0.5–1 mm. long; blades 10–25 cm. long, 8–15 mm. wide, acuminate, the margins strongly scabrous; panicles 10–20 cm. long with several solitary or fascicled spreading racemes; spikelets 3 mm. long, glabrous, pointed, the first glume 1 mm. long, acute, the pedicels bearing a few long stiff hairs below the spikelets; fruit about 2.5 mm. long, obtuse, minutely transversely rugose.

This species, commonly known as Para grass, is widely cultivated for forage. In tropical America it is the most important grass used for this purpose. A native of Africa, it was introduced in Brazil and other American countries. It probably occurs in other departments, although there are definite records only from three, Jutiapa, San Marcos, and Escuintla.

Panicum ramiparum Swallen, Contr. U. S. Nat. Herb. 29: 423. 1950.

Moist brushy slopes, 1,530 meters, Quezaltenango (Santa María de Jesús, *Standley* 66829); Santa María, south of Quezaltenango (*Weatherwax* 160, type).

Perennial; culms erect, or decumbent at the base, 55–60 cm. tall, sparsely to rather densely pilose or papillose-pilose, the nodes bearded; sheaths mostly shorter than the internodes, densely pilose with spreading hairs, the margins rather conspicuously ciliate; ligule ciliate, 0.5 mm. long; blades mostly 5–9 cm. long, 7–13 mm. wide, lanceolate-acuminate, sparsely pubescent on both surfaces with long hairs on the upper surface at the base; panicles 7–9 cm. long, 3–6 cm. wide, the branches stiffly ascending, or the upper spreading, glabrous, very sparsely and obscurely glandular-spotted; spikelets 2.2–2.4 mm. long, glabrous; first glume about 0.8 mm. long; second glume and sterile lemma obtuse, the glume as long as the fruit, the sterile lemma a little shorter; fruit 1.8 mm. long, 1 mm. wide, elliptic, acutish, white, minutely striate.

Panicum reptans L. Syst. Nat. ed. 10. 2: 870. 1759.

Open moist ground, cultivated fields, and waste places; Petén (El Paso); Santa Rosa (Guazacapán). Florida to Texas; eastern Mexico; Nicaragua; West Indies; northern South America; tropics of the Eastern Hemisphere.

Annual; culms decumbent-spreading, freely branching, the ascending branches 10–30 cm. tall; blades flat, cordate, acuminate, 1.5–6 cm. long, 4–12 mm. wide, the undulate white margins ciliate toward the base; panicles 2–6 cm. long, the branches stiffly ascending or spreading, 1–3 cm. long; spikelets 2 mm. long, the first glume short, rounded or truncate.

This species has been considered native in America. Because of its weedy character, however, it may have been introduced from the tropics of the Old World, where it is common.

Panicum rudgei Roem. & Schult. Syst. Veg. 2: 444. 1817. *P. scoparium* Rudge, Pl. Guian. 1: 21. 1805. Not *P. scoparium* Lam., 1798. *P. rudgei brasiliense* Raddi, Agrost. Bras. 48. 1823. *P. dasytrichum* Spreng. Syst. Veg. 1: 317. 1825. *P. rhigiophyllum* Steud. Syn. Pl. Glum. 1: 76. 1854. *P. cayennense divaricatum* Doell in Mart. Fl. Bras. 2 (2): 220. 1877.



FIG. 77. *Panicum purpurascens*. Plant, $\times \frac{1}{2}$; two views of spikelet and floret, $\times 10$.

Dry ridge north of Quiriguá, Izabal. British Honduras (Toledo District). Dry fields, brushy slopes, and savannas, southern Mexico (Tabasco), Jamaica and Trinidad to Bolivia and Brazil.

Perennial; culms 40–110 cm. high, erect, rather coarse, appressed papillose-hispid especially below the nodes; sheaths longer or shorter than the internodes, densely papillose-hispid with appressed or spreading hairs; ligule ciliate, about 1 mm. long; blades 15–40 cm. long, 5–10 mm. wide, thick and firm, ascending, gradually acuminate, densely hirsute or nearly glabrous; panicles terminal and axillary from the upper sheaths, included at the base, overlapping, the branches spreading, implicate, pilose in the axils; spikelets 3.5 mm. long, pointed, somewhat attenuate at the base, sparsely hirsute, the first glume acuminate, two-thirds as long as the spikelet; fruit 2.1 mm. long, smooth and shining.

Panicum schiffneri Hack. *Ergeb. Bot. Exped. Akad. Wiss. Sudbras.* 11. 1906.

Damp rocky thickets, forests, and banks, often clambering in brush, about 1,350 meters; Petén; Alta Verapaz; Jalapa; San Marcos. Southern Mexico and the West Indies to Brazil.

Perennial; culms mostly 1–2 meters, sometimes as much as 3 meters long, straggling or clambering, rather woody, freely branching, rooting at the nodes, retrorsely pilose, especially below the nodes, or sometimes nearly glabrous; sheaths much shorter than the internodes, pilose or papillose-pilose; blades 5–15 cm. long, 1–2.5 cm. wide, lanceolate, acuminate, somewhat asymmetrical, sparsely pilose, the margins scabrous; panicles pyramidal, 10–15 cm. long, nearly as wide, the branches ascending to spreading, at least some of the branches naked at the base; spikelets 1.5 mm. long, elliptic, densely clustered on the short branchlets, glabrous; first glume minute, nerveless; fruit 1.5 mm. long, sparsely pilose with long silky hairs.

Panicum schmitzii Hack. *Ann. Naturhist. Hofmus. Wien* 17: 254. 1902.

Dry upper banks, Volcán Tajumulco, San Marcos, 2,300–2,800 meters. Southern Mexico.

Perennial; culms wiry, ascending from a creeping base, rather freely branching, glabrous, the nodes pubescent; sheaths usually shorter than the internodes, pubescent toward the summit; blades 6–11 cm. long, 7–19 mm. wide, lanceolate, somewhat falcate, acuminate, rounded at the base, sparsely papillose-hispid; panicles 3–8 cm. long, the few solitary branches stiffly ascending, naked at the base; spikelets 1.8 mm. long, glabrous, crowded on the short appressed branchlets; first glume about one-fifth as long as the spikelet, triangular, subacute; fruit 1.5 mm. long, sparsely covered with rather long appressed hairs.

Panicum sellowii Nees, *Agrost. Bras.* 153. 1829. *P. lasianthum* Trin. *Gram. Icon.* 3: *pl.* 245. 1830. *P. puberulum* Trin. *Mém. Acad. St. Pétersb.* VI. *Sci. Nat.* 1: 277. 1834.

Brushy slopes, open forests, moist banks, and shady ravines, from near sea level to about 1,000 meters; Alta Verapaz; Izabal; Quezaltenango; Huehuetenango; San Marcos. British Honduras; southern Mexico (Veracruz) and the West Indies to Paraguay and Argentina (Misiones).

Perennial; culms 60 cm. to more than 1 meter long, branching, straggling, rooting at the lower nodes; sheaths glabrous or papillose-pilose, the margins ciliate at least toward the summit, the collar densely pubescent; blades 4–15 cm. long, 10–30 cm. wide, ovate-lanceolate, acuminate, usually asymmetrical, sparsely pilose or more or less softly pubescent, the margins very scabrous; panicles 10–20 cm. long, the branches ascending or spreading, naked in the lower half or two-thirds, densely pilose in the axils; spikelets appressed to the branchlets, appearing more or less clustered on the branches, 2 mm. long, obovate, obtuse, glabrous or sparsely papillose-hispid; first glume rather narrow, acute or subobtuse, a little more than one-half to three-fourths as long as the spikelet.

Panicum sphaerocarpon Ell. Bot. S. C. & Ga. 1: 125. 1816.
P. dichotomum sphaerocarpon Wood, Class-book ed. 3. 786. 1861.
P. microcarpon sphaerocarpon Vasey, Grasses U. S. 12. 1883.

Open woods, slopes, ravines, and fields, up to 2,500 meters; Alta Verapaz; Izabal; Zacapa; Jalapa; Guatemala; Chimaltenango; Suchitupéquez; Quezaltenango. British Honduras (El Cayo District); eastern United States; Cuba and eastern Mexico to Venezuela.

Perennial; culms 20–55 cm. high, in small tufts, erect or spreading, the nodes appressed-pubescent; sheaths usually longer than the internodes, the margins ciliate, otherwise glabrous, often viscid between the nerves, especially toward the summit; ligule very short or obsolete; blades 4–10 cm. long, 5–15 mm. wide, cordate, the white cartilaginous margins papillose-ciliate toward the base; panicles 5–10 cm. long, long-exserted, loosely flowered, the axis, branches, and pedicels viscid; spikelets subspherical, 1.6–1.8 mm. long, pubescent, or sometimes nearly glabrous; fruit 1.4–1.5 mm. long. Autumnal phase sparingly branched, spreading, the blades and panicles not much reduced.

Panicum stagnatile Hitchc. & Chase, Contr. U. S. Nat. Herb. 17: 528. f. 141. 1915. *P. bernoullianum* Mez, Bot. Jahrb. Engler 56: Beibl. 125: 3. 1921.

Swamps in vicinity of Puerto Barrios, Izabal (*Hitchcock* 9153). Southern Mexico; Honduras; Panama (Canal Zone, *Hitchcock* 8388, type).

Perennial; culms erect from a decumbent base, rooting at the lower nodes, simple or sparingly branched, 1–2 meters long, the nodes glabrous or sparsely pubescent; lower sheaths usually much shorter than the internodes, the upper ones sometimes overlapping, the margins ciliate, more or less hispid at the throat; ligule membranaceous, less than 1 mm. long; blades 20–25 cm. long, 1.5–3 cm. wide, acuminate, gradually narrowed from below the middle, rounded at the base,

glabrous on both surfaces, the margins scabrous; panicles 20–40 cm. long, finally exserted, the branches approximate, stiffly ascending, the lower ones 8–12 cm. long, the branchlets stiffly divergent; spikelets 1.8 mm. long, short-pedicel, acute, glabrous; first glume acute, one-third to one-half as long as the spikelet, the second shorter than the fruit; fruit 1.6 mm. long, acute, the margins inrolled only at the base.

Panicum stenodes Griseb. Fl. Brit. W. Ind. 547. 1864.

Borders of lakes and swamps and clearings in forests; Izabal (Los Amates to Izabal, *Blake* 7749). Costa Rica; West Indies; Colombia; Venezuela; British Guiana; Surinam; northern Brazil.

Similar in habit to *P. tenerum*; panicles solitary or fascicled from the upper nodes, 1–2 cm. long, narrow, few-flowered, the short branches appressed; spikelets 1.4–1.6 mm. long, glabrous, the first glume half as long as the spikelet, blunt; second glume and sterile lemma equal, scarcely longer than the fruit.

Panicum stenodoides Hubb. Amer. Acad. Proc. 49: 497. 1913.

Low pine ridge, Yacos Lagoon, Toledo District, British Honduras (*Peck* 681, type). Not known from Guatemala. Costa Rica; Panama; Trinidad; Venezuela; Brazil.

Perennial; culms 20–40 cm. high, densely tufted, slender, erect, with slender leafless panicle-bearing branches from the upper nodes; sheaths papillose-pilose or nearly glabrous, the lowermost bladeless, becoming fibrous; ligule scarcely 0.5 mm. long, membranaceous, minutely ciliate; blades 3–8 cm. long, 1–2 mm. wide, involute at least toward the tip, papillose-pilose or sometimes glabrous; panicles about 1 cm. long, narrow, short-exserted, bearing 3–7 appressed spikelets; spikelets 2–2.1 mm. long, attenuate at the base; first glume acute, about half as long as the spikelet; fruit 1.7 mm. long.

Panicum stoloniferum Poir. in Lam. Encycl. Suppl. 4: 274. 1816.

Known in Guatemala only in the vicinity of Puerto Barrios, Izabal (*Pittier* 364). Moist or wet forests, swamps, or low ground; southern Mexico; Honduras; Martinique; Trinidad; Panama to northern Argentina.

Perennial; culms very slender, decumbent-spreading, branching, rooting at the lower nodes, 10–50 cm. long, the nodes pubescent or glabrous; sheaths usually much shorter than the internodes, ciliate; blades 1–5 cm. long (rarely to 7 cm.), 3–15 mm. wide, glabrous or minutely pubescent; panicles 1–5 cm. long, with few to several abruptly spreading racemes 5–10 mm. long; spikelets 2.5 mm. long, the first glume acute, one-third to one-half as long as the spikelet; fruit 1.3 mm. long.

Panicum strigosum Muhl. in Ell. Bot. S. C. & Ga. 1: 126. 1816.

P. laxiflorum pubescens Vasey, Contr. U. S. Nat. Herb. 3: 30. 1892.

P. longipedunculatum Scribn. Bull. Tenn. Exp. Sta. 7: 53. 1894.

Sandy pine woods, ravines, and dry or moist open ground, up to 900 meters; Alta Verapaz. British Honduras (Toledo and El Cayo districts); southern Mexico; Costa Rica; Panama; West Indies; Colombia.

Perennial; culms in dense soft spreading tufts, mostly 10–20 cm. high; sheaths glabrous, the margins ciliate; blades 2–5 cm. long, 3–6 mm. wide, thin, bright green, sparsely pilose on the upper surface, conspicuously papillose-ciliate on the margins; panicles 2–5 cm. long, the axis pilose, the branches stiffly ascending or spreading; spikelets 1.3–1.5 mm. long, glabrous; first glume one-third to one-half as long as the spikelet; fruit 1.3 mm. long.

Panicum tenerum Beyr. ex Trin. Mém. Acad. St. Pétersb. VI. Sci. Nat. 1: 341. 1834. *P. anceps strictum* Chapm. Fl. South. U. S. 573. 1860.

Margins of swamps and wet sandy land; Huehuetenango (*Steyermark* 51536). British Honduras (Belize District); southeastern United States; West Indies.

Perennial; culms in small tufts, erect, wiry, 40–90 cm. tall, simple or with small panicles from the upper nodes; sheaths much shorter than the internodes, glabrous, or the lower ones papillose-pilose; blades 4–15 cm. long, 2–4 mm. wide, erect, pilose on the upper surface toward the base; panicles 3–8 cm. long, bearing short, appressed, densely flowered branches, the pedicels with a few hairs toward the summit; spikelets 2.2–2.8 mm. long, pointed, glabrous; first glume clasping, about half as long as the spikelet; second glume and sterile lemma equal, pointed beyond the fruit.

Panicum transiens Swallen, Jour. Washington Acad. Sci. 21: 436. 1931.

Pine woods, 2,400–2,700 meters; El Progreso; Chimaltenango (Chichavac). Mexico (Nuevo León and Tamaulipas), the type from Sierra de San Carlos, Tamaulipas (*Bartlett* 10454).

Perennial, culms erect, 40–70 cm. long, freely branching, pubescent or pilose; sheaths papillose-pilose, densely pubescent on the collar, those of the main culm shorter than the internodes, those of the branches much longer than the internodes; blades 5–12 cm. long, 6–14 mm. wide, lanceolate, flat, pubescent on both surfaces, the white scabrous margins papillose-ciliate toward the rounded base; ligule densely ciliate, about 0.5 mm. long; panicles 8–15 cm. long, the branches rather stiffly ascending or spreading; spikelets (except the terminal ones) short-pedicled, appressed to the branches, 3.5–4 mm. long, pointed at the apex, attenuate at the base, papillose-pubescent; first glume 2 mm. long, subacute, the margins somewhat hyaline; second glume a little shorter than the spikelet exposing the fruit; sterile lemma equaling the spikelet; fruit 3 mm. long, subacute, smooth and shining.

The two specimens from Guatemala (*Skutch* 524 and *Steyermark* 43443) are somewhat doubtfully referred to this species. In vegeta-

tive characters they are similar, but the spikelets are nearly glabrous, with thinner second glume and sterile lemma, and broader, subobtusate first glume. More material may prove this form to be a distinct species.

Panicum trichanthum Nees, Agrost. Bras. 210. 1829. *P. microsperrum* Fourn. ex Hemsl. Biol. Centr. Amer. Bot. 3: 492. 1885.

Damp thickets, swamps, river banks, and along trails in forests from sea level to about 500 meters; Petén; Alta Verapaz; Izabal; Escuintla. British Honduras; Mexico and the West Indies to Paraguay.

Perennial; culms straggling or clambering, geniculate, branching, rooting at the nodes, mostly 1-2 meters long; sheaths shorter than the internodes, glabrous, often ciliate on the margins; blades 8-15 cm. long, 1-2 cm. wide, lanceolate, acuminate, often asymmetrical, rounded or subcordate at the base, sparsely pilose, more or less ciliate, at least near the base; panicles mostly 20-30 cm. long, diffuse, the branches rather stiffly spreading or even reflexed at maturity, the branchlets becoming implicate; spikelets 1.2-1.5 mm. long on long slender spreading pedicels, glabrous; first glume about one-fifth as long as the spikelets.

Panicum trichoides Swartz, Prodr. Veg. Ind. Occ. 24. 1788. *P. capillaceum* Lam. Tabl. Encycl. 1: 173. 1791. *P. capillaceum strictius* Doell in Mart. Fl. Bras. 2 (2): 249. 1877.

Stream bank, moist thickets and forests, common along trails, sometimes a weed in cultivated ground, from sea level to about 1,000 meters; Alta Verapaz; Izabal; Zacapa; Santa Rosa; Escuintla; Quezaltenango; San Marcos. British Honduras; Mexico and the West Indies to Peru and Brazil.

Annual; culms slender, freely branching, decumbent-spreading or creeping, 15-60 cm. long, the branches ascending; sheaths shorter than the internodes or the upper ones overlapping, papillose-hispid with spreading hairs; blades 4-7 cm. long, 8-15 mm. wide, ovate or ovate-lanceolate, thin, more or less pilose, the margins ciliate toward the base; panicles 5-20 cm. long, more or less included in the upper sheath, the slender branches ascending or spreading, the branchlets and pedicels of the spikelets capillary, divergent; spikelets 1.5 mm. long, sparsely pilose or nearly glabrous, the fruit exposed at the summit; first glume about half as long as the spikelet.

Panicum tuerckheimii Hack. Allg. Bot. Zeitschr. 12: 60. 1906.

Known in Guatemala only from the type locality, Cubilgüitz, Alta Verapaz (*Tuerckheim* 820, type). British Honduras (Toledo District, *Smart* 41); Mexico (Veracruz, *Santos* 2467).

Perennial; culms erect, as much as 1 meter tall, the nodes appressed-hispid; sheaths as long as or longer than the internodes; blades 10–30 cm. long, 1.5–2.5 cm. wide, acuminate, narrowed toward the base, the margins ciliate at the base; panicles 15–30 cm. long, the branches rather distant, ascending, the lower ones as much as 15 cm. long; spikelets 3 mm. long, acuminate, glabrous or sparsely pilose, usually in pairs, the first subsessile, the second with a pedicel 2–3 mm. long; first glume a minute nerveless scale; second glume and sterile lemma pointed beyond the fruit; fruit 2.4 mm. long, with a minute tuft of hairs at the pointed apex.

Panicum umbonulatum Swallen, Contr. U. S. Nat. Herb. 29: 420. 1950.

Upper slopes of Sierra de Las Minas, along Río Repollal, 2,100–2,400 meters, Zacapa (*Steyermark* 42469, type). Honduras.

Perennial; culms decumbent-spreading, probably about 1 meter long, branching and rebranching, rooting at the lower nodes, papillose or papillose-pilose to nearly glabrous; sheaths usually longer than the internodes, papillose or papillose-pilose, rather densely pubescent across the back on the collar; ligule a very short ciliate membrane about 0.5 mm. long; blades 5–10 cm. long, 3–8 mm. wide, nearly glabrous, with a few long hairs on the upper surface at the base, the margins papillose-ciliate toward the base; panicles about 11 cm. long, 5–6 cm. wide, purple, the branches rather stiffly ascending, more or less viscid-spotted, glabrous; spikelets 2.4–2.5 mm. long, glabrous; first glume acute or subobtuse, about half as long as the spikelet; second glume and sterile lemma equal, slightly pointed beyond the fruit; fruit 2.1 mm. long, elliptic, acute, shining.

Panicum venezuelae Hack. Oesterr. Bot. Zeitschr. 51: 368. 1901.

Dry, rocky, brushy hillsides and thickets, about 1,100 meters; Guatemala. Venezuela; Brazil.

Perennial; culms erect, or usually widely spreading, prostrate, or clambering in brush, slender, 15 cm. to more than 1 meter long, the nodes rather densely retrorsely bearded; sheaths shorter than the internodes, pilose at least on the margins; blades 2–8 cm. long, 2–8 mm. wide, rarely wider, subacuminate, pubescent or pilose on both surfaces, usually ciliate at the rounded base; inflorescence commonly 2–15 cm. long, the solitary, distant, raceme-like branches spreading or reflexed, very short to as much as 4 cm. or even 6 cm. long; spikelets usually in pairs, short-pedicellate, crowded on the branches or branchlets, 2.5–3 mm. long; first glume half as long as the spikelet, acute, clasping; second glume and sterile lemma subequal, much longer than the fruit, sparsely to rather densely pilose or papillose-pilose, at least on the margins.

Panicum villosissimum Nash, Bull. Torrey Club 23: 149. 1896. *P. dichotomum* var. *villosum* Vasey, U. S. Dept. Agr. Div. Bot. Bull. 8: 31. 1889. *P. atlanticum* Nash, Bull. Torrey Club 24: 346. 1897.

Pine oak forest; Baja Verapaz; Zacapa; Guatemala; Chimaltenango; Huehuetenango. Eastern United States; eastern Mexico (Tamaulipas, Puebla); Honduras.

Perennial; culms erect or ascending, 20–45 cm. long, pilose with long, spreading hairs; sheaths conspicuously pilose with long, spreading or reflexed hairs; ligule 4–5 mm. long; blades 6–10 cm. long, 5–10 mm. wide, pilose or papillose-pilose, the hairs rather stiff, longer and sparser on the upper surface; panicles 4–8 cm. long, the axis pilose, the branches ascending or spreading, few-flowered; spikelets 2.2–2.3 mm. long, papillose-pubescent; first glume one-third to one-half as long as the spikelet. Autumnal phase decumbent, becoming prostrate, the fascicled branches usually appressed, the blades somewhat reduced.

Panicum viscidellum Scribn. U. S. Dept. Agr. Div. Agrost. Circ. 19: 2. 1900. *P. reflexopilum* Steud. Syn. Pl. Glum. 1: 84. 1854.

Pine forests, damp thickets, and rocky hillsides up to about 1,350 meters; Alta Verapaz; Izabal; Chiquimula; Jalapa; Sololá; Suchitepéquez; Quezaltenango; San Marcos. British Honduras (El Cayo District); southern Mexico to Colombia.

Perennial; culms 30–100 cm. long, ascending from a decumbent, spreading or creeping base, simple at first but finally rather freely branching, softly villous or nearly glabrous, the nodes usually bearded; sheaths mostly shorter than the internodes, pilose or papillose-pilose, sometimes nearly glabrous; ligule densely ciliate, 2–4 mm. long; blades 5–13 cm. long, 9–13 mm. wide, lanceolate, subcordate, softly pubescent or villous on both surfaces; panicles 4–11 cm. long, rather densely flowered, the branches ascending, spreading, or even reflexed, the branchlets and pedicels spreading, implicate; spikelets 1.8–1.9 mm. long, sparsely pubescent or nearly glabrous; first glume about one-third as long as the spikelet, subacute; second glume and sterile lemma rather strongly nerved, slightly exceeding the fruit; fruit 1.5 mm. long, abruptly pointed.

Panicum wrightianum Scribn. U. S. Dept. Agr. Div. Agrost. Bull. 11: 44. f. 4. 1898.

Pine ridges, British Honduras (Belize District). Not known from Guatemala. Southeastern United States; Cuba.

Perennial; culms densely tufted, slender, spreading, becoming decumbent, about 20 cm. tall or sometimes taller; ligule 2–3 mm. long; blades flat, 2–4 cm. long, 2–4 mm. wide, minutely pubescent below, short-pilose to nearly glabrous above, the margins scabrous; panicles 2–3 cm. long (or as much as 6 cm.), the branches ascending; spikelets long-pedicellate, 1 mm. long, pubescent. Autumnal phase bushy-branched with scarcely reduced blades and panicles.

Panicum xalapense H.B.K. Nov. Gen. & Sp. 1: 103. 1815. *P. ruprechtii* Fourn. Mex. Pl. 2: 21. 1886.

Moist or wet forests, thickets, pine woods, open banks and dry rocky hills, 900–2,300 meters or possibly higher; Alta Verapaz; Baja

Verapaz; Zacapa; Chiquimula; Suchitepéquez; Quezaltenango; San Marcos. Southeastern United States; eastern Mexico; Costa Rica; Honduras; Cuba; Hispaniola.

Perennial; culms in small dense tufts, erect or spreading, mostly 10–30 cm. tall; sheaths conspicuously retrorsely pilose; blades usually 4–12 cm. long, 3–8 mm. wide, pilose on both surfaces, the margins ciliate; panicles 2–6 cm. long, the branches spreading or reflexed, relatively few-flowered; spikelets 1.9–2 mm. long, obtuse; first glume about one-third the length of the spikelet; second glume and sterile lemma papillose-pilose. Autumnal phase branching from the lower nodes, the blades not much reduced.

Panicum zizanioides H.B.K. Nov. Gen. & Sp. 1: 100. 1815. *P. oryzoides* Swartz, Prodr. Veg. Ind. Occ. 23. 1788. Not *P. oryzoides* Ard. 1764. *P. pseudoryzoides* Steud. Syn. Pl. Glum. 1: 75. 1854. *Acroceras oryzoides* Stapf in Prain. Fl. Trop. Afr. 9: 622. 1920.

Moist woods, swamps, and open ground at low altitudes, Alta Verapaz (Cubilgüitz). Common, southern Mexico and the West Indies to northern Argentina.

Perennial; culms 50 cm. to as much as 2 meters long, decumbent-spreading, rooting at the nodes, the lower internodes short; sheaths mostly shorter than the internodes, glabrous or papillose-hispid toward the summit, hispid in the throat, the margins ciliate; ligule about 0.5 mm. long, membranaceous; blades 4–15 cm. long, 8–30 mm. wide, acuminate, cordate, the margins very scabrous; panicles 10–25 cm. long, the few rather distant branches stiffly ascending or spreading, nearly simple; spikelets paired, rather short-pedicellate, appressed, 5.5–6 mm. long, glabrous; first glume broad, clasping, about two-thirds as long as the spikelet; second glume and sterile lemma equal, laterally compressed and keeled at the summit; fruit 4.7–5 mm. long, smooth and shining, laterally compressed at the summit, forming a small crest.

PASPALUM L.¹

Spikelets plano-convex, solitary or in pairs, arranged in two rows on one side of a narrow wingless to broadly winged rachis, the back of the fruit turned toward the rachis; first glume wanting or present on some, occasionally on all of the spikelets; second glume and sterile lemma equal, covering the fruit, or the glume a little shorter, rarely wanting; fruit indurate, usually pale, sometimes dark brown, smooth and shining or minutely striate, the margins of the lemma inrolled, enclosing the palea.

Annuals or perennials with one to many racemes, these solitary, paired, or racemose at the summit of the main culm and branches.

Species more than 400 in the tropics and warm temperature regions of both hemispheres; especially abundant in Brazil.

¹ Key adapted from Agnes Chase, The North American Species of Paspalum, Contr. U. S. Nat. Herb. 28 (1). 1929.

Rachis membranaceous or foliaceous, mostly broad and winged.

Spikelets clothed with long silky hairs or conspicuously fringed with long hairs.

Second glume broadly winged; sterile lemma fringed with long hairs; glume cordate at base. *P. pectinatum*.

Second glume not winged; sterile lemma inconspicuously fringed.

Rachis brightly colored, the margins golden to rufous; spikelets solitary.

P. stellatum.

Rachis dull, greenish, purplish, or brown; spikelets paired or solitary.

Rachis 4-5 mm. wide; culms robust, clambering; racemes usually more than 8. *P. trachycoleon*.

Rachis not more than 3 mm. wide; plants not robust and clambering; racemes mostly 2-5.

Blades papillose-ciliate, those of the primary culm mostly 8-12 mm. wide; fringing hairs of spikelet stiff, about equal.

P. humboldtianum.

Blades not ciliate, those of the primary culm not more than 7 mm. wide; fringing hairs of spikelet very unequal. *P. cymbiforme*.

Spikelets glabrous or minutely pubescent; rachis foliaceous, green.

Plants perennial, aquatic or semiaquatic.

Rachis with a spikelet at the apex; racemes persistent; second glume developed. *P. acuminatum*.

Rachis extending beyond the uppermost spikelet; racemes falling from the axis. *P. repens*.

Plants annual; not aquatic.

Plants smooth or slightly scabrous; spikelets 2.3-2.5 mm. long.

P. candidum.

Plants very scabrous throughout; spikelets 1.8-1.9 mm. long. . . . *P. scabrum*.

Rachis not membranaceous, foliaceous, or winged.

Inflorescence a large flabellate panicle of numerous racemes. Spikelets solitary, glabrous or minutely ciliate. *P. fasciculatum*.

Inflorescence not flabellate.

Racemes 2, conjugate or nearly so at the summit of the culm, rarely a third below.

Spikelets elliptic to narrowly ovate; plants with creeping rhizomes or stolons.

Second glume pubescent; spikelets relatively turgid. *P. distichum*.

Second glume and sterile lemma glabrous; spikelets flattened.

P. vaginatum.

Spikelets suborbicular, ovate, or obovate.

Spikelets long-silky around the margins; plants stoloniferous.

P. conjugatum.

Spikelets not silky on the margins; plants not stoloniferous.

Plants annual, small, slender; spikelets not more than 1.5 mm. long.

Spikelets orbicular, some of them beaded with globular hairs.

P. multicaule.

Spikelets obovate, glabrous or minutely pubescent. *P. clavuliferum.*

Plants perennial; spikelets 1.8-3 mm. long.

Spikelets golden-brown, transversely marked with dark lines.

P. serpentinum.

Spikelets green, not marked; plants with stout horizontal rhizomes.

Spikelets 2.5-3 mm. long. *P. notatum.*

Spikelets less than 2.5 mm. long. *P. minus.*

Racemes 1-many, racemose or fascicled on the axis, not conjugate.

Second glume wanting. *P. pulchellum.*

Second glume developed.

First glume developed on at least one of the pair of spikelets.

Spikelets not more than 2 mm. long; plants decumbent, creeping.

First glume small, about equally developed on all spikelets.

P. decumbens.

First glume obsolete or only occasionally developed. *P. nutans.*

Spikelets more than 2 mm. long; plants not decumbent.

Spikelets glabrous.

Nodes, at least the lower, pubescent; sterile lemma minutely papillose; first glume commonly well developed.

Racemes 2 or 3. *P. peckii.*

Racemes solitary. *P. pilosum.*

Nodes glabrous; sterile lemma not papillose; first glume commonly rudimentary or obsolete. *P. adoperiens.*

Spikelets pubescent, at least on the second glume.

First glume developed in both spikelets, rarely wanting in the primary spikelet. *P. langei.*

First glume obsolete or nearly so on the primary spikelet, often or commonly obsolete on the secondary. *P. botterii.*

First glume normally wanting.

Racemes terminal and axillary. Plants rooting at the lower nodes.

P. nutans.

Racemes terminal on the primary culm or leafy branches, no truly axillary racemes.

Plants annual.

Spikelets not more than 1.5 mm. long, elliptic; fruit pale.

P. microstachyum.

Spikelets 2-3 mm. long; fruit dark brown.

Spikelets 2.4-3 mm. long, commonly appressed-pubescent.

P. convexum.

Spikelets not more than 2.2 mm. long, glabrous; rachis 2-2.5 mm. wide. *P. boscianum.*

Plants perennial.

Plants creeping, rooting at the nodes.

Plants not stoloniferous; fruit pale *P. squamulatum*.

Plants stoloniferous; fruit reddish.

Spikelets 1–1.2 mm. long; blades 1–6 cm. long.

P. orbiculatum.

Spikelets 1.7–1.8 mm. long; blades 5–13 cm. long; glume and sterile lemma irregularly wrinkled *P. hitchcockii*.

Plants not creeping, sometimes rooting at one or two nodes of a decumbent base.

Spikelets conspicuously villous around the margin, the hairs as long as the spikelet or longer.

Racemes commonly 3–5; spikelets 2.8–3.8 mm. long, about 2 mm. wide *P. dilatatum*.

Racemes commonly 12–18; spikelets 2.2–2.7 mm. long, 1.2–1.5 mm. wide *P. urvillei*.

Spikelets not conspicuously ciliate.

Fruit dark brown, smooth and shining *P. plicatulum*.

Fruit pale, or, if brown, not smooth and shining.

Plants robust; culms commonly more than 1 meter high; spikelets normally in pairs.

Culms freely branching; racemes 10–45; spikelets elliptic, glandular-pubescent *P. coryphaeum*.

Culms simple or with a few simple branches; blades firm, with sharp-cutting edges.

Sheaths, at least the lower, harshly hispid . . . *P. affine*.

Sheaths not hispid.

Spikelets pubescent, at least toward the summit; blades flat, more or less arcuate-spreading.

Fruit brown at maturity.

Spikelets obovate, obtuse *P. virgatum*.

Spikelets elliptic, subacute *P. conspersum*.

Fruit pale; spikelets abruptly acute or subacute.

P. plenum.

Spikelets glabrous; blades V-shaped in cross section, ascending.

Spikelets suborbicular, crowded, 2–2.4 mm. long; rachis sparsely ciliate with stiff hairs.

P. millegrana.

Spikelets obovate-elliptic; rachis not ciliate.

P. arundinaceum.

Plants not robust; if more than 1 meter high, culms relatively slender.

Spikelets hemispheric, not more than 1.9 mm. long.

Spikelets not more than 1.5 mm. long, crowded.

P. paniculatum.

Spikelets 1.7–1.9 mm. long, not densely crowded.

P. lentiginosum.

Spikelets elliptic to oval or obovate.

Culms decumbent at base, branching, rooting at the lower nodes.

Sheaths, at least the lower, harshly hispid.

P. botterii.

Sheaths glabrous or softly pubescent.

Panicle axis very slender, flexuous; spikelets 2–2.5 mm. long, usually minutely apiculate.

P. lividum.

Panicle axis slender but straight; spikelets 2.5–3 mm. long, not apiculate.....*P. tinctum.*

Culms erect to spreading, not rooting at the nodes.

Spikelets not more than 1.8 mm. long, in pairs.

Spikelets about 1.3 mm. long, glandular-pubescent.....*P. blodgettii.*

Spikelets 1.5 mm. long or longer; nodes appressed-pilose.....*P. caespitosum.*

Spikelets 2 mm. long or longer.

Blades mostly 1–2.5 cm. wide.

Spikelets elliptic, subacute.

Culms 1–4 meters high; racemes 10–45.

P. coryphaeum.

Culms mostly less than 1 meter high; racemes not more than 10.

Second glume equaling the fruit, minutely pubescent.....*P. costaricense.*

Second glume shorter than the fruit, obtuse, sparsely pilose.

P. corcovadense.

Spikelets elliptic-obovate.

Second glume shorter than the spikelet; racemes usually fewer than 10.

P. botterii.

Second glume covering the fruit; racemes 10–30.

Culms 1–2 meters high; spikelets 1.5 mm. wide.....*P. affine.*

Culms 45–55 cm. high; spikelets about 1 mm. wide.....*P. hispidum.*

Blades not more than 1 cm. wide.

Foliage velvety-pubescent throughout.

P. tenellum.

Foliage not velvety-pubescent.

Second glume papillose-pubescent.

P. jaliscanum.

Second glume glabrous. *P. ligulare.*

***Paspalum acuminatum* Raddi, Agrost. Bras. 25. 1823.**

Edge of water, La Laguna, at base of Volcán Jumay, Jalapa (*Steyermarck* 32250), 1,400–1,600 meters. Louisiana; Texas; Mexico (Michoacán); Colombia to Brazil and Argentina.

Decumbent or creeping, branching, aquatic or semiaquatic, glabrous perennial; culms 30–100 cm. long, compressed; sheaths loose, keeled, mostly longer than the internodes; blades 4–12 cm. long, 5–12 mm. wide, rounded at the base; racemes 2–5, 3.5–7 cm. long, the rachis 2.5–4 mm. wide, terminating with a spikelet; spikelets 3.5 mm. long, elliptic, the second glume and sterile lemma thin, rather abruptly pointed beyond the fruit; fruit 2.9 mm. long.

***Paspalum adoperiens* (Fourn.) Chase, Contr. U. S. Nat. Herb. 28: 102. f. 55. 1929. *Dimorphostachys adoperiens* Fourn. Mex. Pl. 2: 15. 1886. *Paspalum guatemalense* Bartlett, Proc. Amer. Acad. 43: 49. 1907.**

Thickets, damp meadows, and open banks, sometimes a weed in cultivated ground; Alta Verapaz; Zacapa; Guatemala; Sololá; Suchitepéquez; Retalhuleu; Quezaltenango. Southern Mexico; El Salvador.

Perennial; culms 35–95 cm. high, sparingly branching, compressed, glabrous; sheaths mostly shorter than the internodes, sparsely papillose-pilose toward the summit, the margins densely ciliate; blades 5–22 cm. long, 8–16 mm. wide, papillose-pilose or papillose-hispid to nearly glabrous; racemes 2–4, sometimes solitary, 3–7.5 cm. long, on slender axillary peduncles; spikelets 2.1–2.5 mm. long, obovate or suborbicular, glabrous or sparsely pilose; first glume short and obtuse to about half as long as the spikelet, acute; sterile lemma as long as the fruit, the glume a little shorter.

***Paspalum affine* Steud. Syn. Pl. Glum. 1: 24. 1854.**

Swamps and wet places, up to 400 meters; Izabal; Zacapa. Southern Mexico.

Perennial; culms coarse, 1–2 meters high, ascending, often geniculate, simple or sparingly branching, glabrous; sheaths elongate, usually much longer than the internodes, tuberculate-hispid or sometimes nearly glabrous; blades 15–50 cm. long, 1.2–2.3 cm. wide, acuminate, rounded at the base, the margins very scabrous; inflorescence rather dense, composed of 10–31 ascending to drooping racemes, the lower ones 7–11 cm. long; spikelets 2–2.3 mm. long, paired, crowded, obovate-elliptic; second glume and sterile lemma equal, covering the fruit, the glume silky on the margins, otherwise nearly glabrous.

Paspalum arundinaceum Poir. in Lam. Encycl. Suppl. 4: 310. 1816. *P. elatum* Rich. ex Doell in Mart. Fl. Bras. 2 (2): 78. 1877.

Swamps and wet places at low altitudes; Izabal; Huehuetenango. West Indies; French Guiana; Brazil (Rio Branco).

Robust, glabrous, perennial; culms simple, as much as 2 meters high; sheaths as long as or longer than the internodes; blades 0.5–1 meter long or longer, 5–10 mm. wide, narrowed toward the base, attenuate, scabrous on the margins; racemes 9–25, ascending, somewhat crowded, 8–20 cm. long; spikelets 2.5–2.7 mm. long, obovate or elliptic, glabrous; second glume and sterile lemma equal, slightly pointed beyond the fruit.

Paspalum blodgettii Chapm. Fl. South. U. S. 571. 1860. *P. simpsoni* Nash, Bull. Torrey Club 24: 39. 1897. *P. gracillimum* Nash in Small, Fl. Southeast U. S. 73. 1903. *P. yucatanum* Chase, Contr. U. S. Nat. Herb. 28: 121. f. 17. 1929.

Sandy pine-oak woods and open rocky places at low altitudes; Huehuetenango. British Honduras (El Cayo District); Florida; Yucatan Peninsula; Honduras; West Indies.

Perennial; culms slender, erect, 40–100 cm. high, the base hard, somewhat swollen, with densely villous scales; sheaths keeled, pubescent, or the upper ones nearly glabrous, the lower ones crowded, the upper elongate, distant; blades 5–25 cm. long, 3–14 mm. wide, usually rounded at the base, papillose-hispid-ciliate toward the base, glabrous or obscurely pubescent; racemes 2–12, rather distant, ascending or spreading, 2–8 cm. long; spikelets 1.3–1.4 mm. long, obovate, blunt, crowded; second glume and sterile lemma equal, covering the fruit, at least the glume covered with gland-tipped hairs.

Paspalum boscianum Flugge, Monogr. Pasp. 170. 1810. *P. virgatum* Walt. Fl. Carol. 75. 1788. Not *P. virgatum* L., 1759. *P. purpurascens* Ell. Bot. S. C. & Ga. 1: 108. pl. 6, f. 3. 1816. *P. confertum* LeConte, Jour. de Phys. Chym. 91: 285. 1820. *P. virgatum* var. *purpurascens* Wood, Class-book ed. 3. 781. 1861.

Moist or wet ground; Alta Verapaz. Southeastern United States; Panama; Puerto Rico; northern Brazil.

Annual; culms 20–100 cm. high, ascending or spreading, branching, sometimes rooting at the lower nodes, glabrous; sheaths compressed, keeled, longer than the internodes, glabrous or the lowermost rarely pilose; ligule 2–3.5 mm. long, brown; blades 10–40 cm. long (mostly 15–30 cm.), 6–18 mm. wide, glabrous or papillose-pilose on the upper surface toward the base, the margins very scabrous; racemes 2–15, rarely solitary in depauperate plants, 2.5–9 cm. long, ascending or finally spreading, somewhat arcuate, the rachis 2–2.5 mm. wide, scabrous on the margins, usually with a tuft of long hairs at the base; spikelets 2–2.2 mm. long, paired, crowded, obovate to suborbicular, glabrous, rusty brown at maturity; glume and sterile lemma equal, barely covering the fruit, fragile, not wrinkled; fruit dark brown, shining, minutely papillose-striate.

Paspalum botterii (Fourn.) Chase, Jour. Washington Acad. Sci. 13: 436. 1923. *P. macrophyllum* var. *piliferum* Fourn. Mex. Pl. 2: 11. 1886. *Dimorphostachys botterii* Fourn. Mex. Pl. 2: 14. 1886. *D. paspaloides* Fourn. Mex. Pl. 2: 14. 1886.

Open wooded slopes, along streams and ditches, sometimes a weed in cultivated ground; Petén; Guatemala. Southern Mexico; Nicaragua; Costa Rica.

Perennial; culms 60–130 cm. high, ascending, compressed, glabrous; sheaths longer than the internodes, keeled toward the summit, glabrous to papillose-hispid; blades 14–40 cm. long, 1–2.4 cm. wide, sparsely papillose-hispid, the margins scabrous, more or less hispid-ciliate; racemes 4–15 cm. long, rarely more, distant, or the upper approximate, arcuate-spreading; spikelets 2.3–2.6 mm. long, elliptic or somewhat obovate; first glume of the primary spikelet obsolete, usually developed on the secondary; second glume a little shorter than the fruit, obtuse, pilose, the sterile lemma as long as the fruit, sparsely pilose or nearly glabrous.

Paspalum caespitosum Flugge, Monogr. Pasp. 161. 1810. *P. gracile* Poir. in Lam. Encycl. Suppl. 4: 313. 1816. *P. heterophyllum* Desv. ex Poir. in Lam. Encycl. Suppl. 4: 315. 1816. *P. lineare* Fourn. Mex. Pl. 2: 12. 1886. *P. caespitosum* var. *longifolium* Vasey, Bull. Torrey Club 13: 164. 1886.

Shady places in limestone soil and sandy pinelands; Alta Verapaz; Izabal; Huehuetenango. British Honduras; Florida; Yucatan Peninsula; West Indies.

Perennial; culms in dense, erect or spreading clumps, mostly 30–60 cm. high, the leaves usually crowded toward the base; blades 5–20 cm. long, 4–10 mm. wide, narrowed to the base, more or less pilose or nearly glabrous, the margins often ciliate; racemes 2–6, 1.5–6 cm. long, remote, ascending or spreading; spikelets 1.5–1.8 mm. long, pilose or nearly glabrous; second glume and sterile lemma subequal, the glume slightly shorter than the fruit.

Paspalum candidum (Humb. & Bonpl.) Kunth, Mem. Mus. Hist. Nat. 2: 68. 1815. *Reimaria candida* Humb. & Bonpl. ex Flugge, Monogr. Pasp. 214. 1810.

Wet thickets, moist banks, shady places, and pastures, sometimes a weed in coffee plantations, up to about 2,000 meters; Alta Verapaz; Jalapa; Santa Rosa; Guatemala; Sacatepéquez; Chimaltenango; Sololá; Quezaltenango. Southern Mexico to Chile.

Annual; culms 15 cm. to 1 meter or more long, erect or ascending from a decumbent base, straggling or even clambering, rooting at the lower nodes, freely branching, flattened, smooth and shining or rarely retrorsely scabrous below the nodes; sheaths usually shorter than the internodes, thin and rather loose, the margins ciliate toward the summit; ligule about 1.5 mm. long, erose; blades 5–10 cm. long, 6–20 mm. wide, thin, flat, pilose or papillose-pilose on both surfaces

or nearly glabrous, the margins scabrous; panicles 5–12 cm. long, scarcely exerted; racemes 8–20, ascending or spreading, 2–4 cm. long, falling entire, the rachis 2–2.5 mm. wide, scabrous, densely pubescent at the base, extending beyond the spikelets; spikelets 2.3–2.5 mm. long, solitary, rather distant, oblong, glabrous, the second glume wanting; fruit as long as the sterile lemma, white, smooth and shining.

Paspalum clavuliferum Wright, Anal. Acad. Cienc. Habana 8: 203. 1871. *P. pittierii* Hack. ex Beal, Grasses N. Amer. 2: 88. 1896.

Brushy or rocky slopes, about 850 meters; Jutiapa. British Honduras; southern Mexico; West Indies; Honduras; Costa Rica; Panama; Colombia; British Guiana; Brazil.

Annual; culms 5–45 cm. high, slender, tufted, erect to spreading, branching at the lower nodes; sheaths mostly overlapping, or shorter than the internodes in taller plants, papillose-hispid, sometimes with only a few hairs near the margins toward the summit; ligule 0.5–1 mm. long; blades 3–16 cm. long, 1.5–4 mm. wide, ascending, sparsely to rather densely papillose-hispid, especially along the mid-nerve and on the margins; racemes solitary or paired, 1–5.5 cm. long, arcuate, long-exserted, the rachis slender, straight or somewhat flexuous; spikelets 1.1–1.5 mm. long, paired, obovate, usually sparsely to densely pubescent with slender capitate hairs, rarely glabrous; second glume and sterile lemma equal or the glume a little shorter; fruit a little smaller than the spikelet, elliptic rather than obovate, striate.

Paspalum conjugatum Bergius, Act. Helv. Phys. Math. 7: 129. pl. 8. 1762. *P. tenue* Gaertn. f. Fruct. & Sem. 2: 2. pl. 80. 1791. *P. ciliatum* Lam. Tabl. Encycl. 1: 175. 1791. *P. renggeri* Steud. Syn. Pl. Glum. 1: 17. 1854. *P. longissimum* Hochst. ex Steud. Syn. Pl. Glum. 1: 19. 1854. Figure 78.

Pine ridges, grassy banks, fields and waste places, usually in moist ground, up to about 1,000 meters; Petén; Alta Verapaz; Izabal; Santa Rosa; Escuintla. Florida to Texas; Mexico and the West Indies to Argentina. Common throughout the tropics.

Stoloniferous perennial; culms as much as 2 meters long, but usually less than 1 meter, often decumbent at the base and rooting at the lower nodes, simple or sparingly branched; stolons long, leafy with erect or ascending flowering branches, the nodes usually conspicuously pilose; culm sheaths loose, compressed, pubescent on the collar, the margins ciliate, those of the stolons short and broad; blades mostly 8–12 cm. long, 5–15 mm. wide, thin, glabrous or sometimes pubescent, the margins scabrous or short-ciliate; racemes 2, conjugate, widely spreading, 4–15 cm. long; spikelets 1.4–1.8 mm. long, ovate, minutely pointed, the margins of the glume papillose-ciliate with long fine hairs.

Paspalum conjugatum var. *pubescens* Doell in Mart. Fl. Bras. 2 (2): 55. 1877.



FIG. 78. *Paspalum conjugatum*. Plant, $\times \frac{1}{2}$; two views of spikelet and floret, $\times 10$.

Alta Verapaz; Izabal. British Honduras; Lesser Antilles; southern Mexico to Brazil. Less frequent than the species.

Plants coarser, the blades as much as 25 cm. long, papillose-pilose or nearly glabrous; racemes as much as 20 cm. long; spikelets 1.7–2.2 mm. long, more conspicuously fringed.

Paspalum conspersum Schrad. ex Schult. Mant. 2: 174. 1817.

Moist open ground, Manatee Lagoon, Belize District, British Honduras. Not known from Guatemala. Southern Mexico; Brazil; Bolivia; Paraguay; Argentina.

Perennial; culms erect in dense clumps, resembling *P. virgatum*; panicles erect, 15–25 cm. long, of 6–20 ascending to spreading or drooping racemes, 7–15 cm. long; margin of rachis scaberulous but with no long hairs; spikelets 2.7–3 mm. long, elliptic, deep purple to rusty brown, usually softly pubescent; fruit chestnut-brown, papillose-striate.

Paspalum convexum Humb. & Bonpl. in Flugge, Monogr. Pasp. 175. 1810. *P. villifolium* Steud. Syn. Pl. Glum. 1: 20. 1854. *P. encylocarpum* Nees ex Steud. Syn. Pl. Glum. 1: 27. 1854. *P. hemi-cryptum* Wright, Anal. Acad. Cienc. Habana 8: 204. 1871; Wright & Sauv. Fl. Cubana 196. 1873. *P. inops* Vasey, Contr. U. S. Nat. Herb. 1: 281. 1893.

Damp thickets, oak forests, brushy or rocky slopes, along streams and roadsides, sometimes a weed in cultivated ground, up to about 1,800 meters; Petén; Alta Verapaz; Izabal; Zacapa; Jalapa; Jutiapa; Santa Rosa; Guatemala; Sacatepéquez; Huehuetenango; Chimaltenango. Mexico to Panama; Cuba; Trinidad; Colombia; Venezuela; Ecuador; Brazil.

Annual; culms 10–75 cm. usually 20–40 cm. high, erect or ascending, sometimes widely spreading, branching from the lower and middle nodes; sheaths compressed, keeled, longer than the internodes in small plants, shorter than the internodes on taller plants, from glabrous to conspicuously papillose-pilose; ligule about 2 mm. long, brown, fragile; blades 5–23 cm. long, 3–11 mm. wide, the uppermost sometimes reduced, somewhat clasping at the base, conspicuously papillose-pilose throughout or only toward the base; racemes 1–4, erect to spreading at maturity, 1.5–7 cm. long, the rachis 1–2 mm. wide, long-pilose at the base; spikelets 2.2–3 mm. long, paired, broadly obovate, glabrous or appressed-pubescent; fruit dark brown, shining, minutely striate.

Paspalum corcovadense Raddi, Agrost. Bras. 27. 1823.

Along banks of Río Frio, Mountain Pine Ridge, El Cayo District, British Honduras (*Lundell* 6640). Not known from Guatemala. Southern Mexico (Oaxaca); Brazil.

Perennial; culms tufted, erect, 50 cm. to more than 1 meter high, the base hard, somewhat swollen, with densely villous cataphylls; sheaths narrow, keeled, papillose-pilose on the margins, the lower ones crowded, the upper ones distant, elongate; blades mostly 10–18 cm. long, 7–15 mm. wide, the uppermost greatly reduced, narrowed to the base, with long stiff hairs on the upper surface at the base; inflorescence usually long-exserted, the peduncle slender; racemes 2–11, ascending or arcuate spreading, the lower ones as much as 10 cm. long, with long hairs in the axils; spikelets 2 mm. long, 1 mm. wide, elliptic; second glume obtuse, a little shorter than the fruit, sparsely pilose, the lemma equaling the fruit; nearly glabrous.

Paspalum coryphaeum Trin. Gram. Pan. 114. 1826. *P. pruinatum* Trin. Gram. Icon. 3: pl. 272. 1836. *P. familiare* Steud. Syn. Pl. Glum. 1: 24. 1854. *P. violascens* Mez, Repert. Sp. Nov. Fedde 15: 73. 1917.

Wet sand, Río On, Mountain Pine Ridge, El Cayo District, British Honduras. Not known from Guatemala. Panama; Trinidad; Colombia; Venezuela; British Guiana; Brazil.

Perennial; culms in tough clumps from short hard rhizomes, 1–4 meters high, slender or robust, glabrous to densely papillose-hispid at least below the glabrous to conspicuously bearded nodes, finally branching, the branches slender, leaning or drooping; sheaths mostly longer than the internodes, the lower ones usually papillose-hispid, the upper ones glabrous or only sparsely papillose-hispid, the margins sometimes ciliate toward the summit; ligule firm, 1–3 mm. long; blades 12–32 cm. long, 8–23 mm. wide, rounded at the base, glabrous or scaberrulous, sometimes sparsely pubescent or pilose with a dense line of long hairs just above the ligule, the margins scabrous; panicles nodding or drooping, composed of 10–45 racemes spreading or recurved at maturity, the lower 6–14 cm. long, the axis 10–25 cm. long, glabrous or sparsely pilose; rachis about 0.5 mm. wide, scabrous, densely hairy in the axils, sometimes naked at the base; spikelets 2–2.5 mm. long, elliptic, paired, usually loosely arranged toward the base of the racemes, denser above; glume and sterile lemma equal, scarcely covering the fruit, finely pubescent or, especially the lemma, nearly glabrous.

Paspalum costaricense Mez, Repert. Sp. Nov. Fedde 15: 72. 1917.

Pine-oak forests and moist open ground, often a weed in cultivated ground, mostly 1,100–2,500 meters; Alta Verapaz; Jalapa; Guatemala; Chimaltenango; Huehuetenango; Suchitepéquez; Quezaltenango; San Marcos. El Salvador; Costa Rica.

Perennial; culms erect or ascending, 25–85 cm. high, compressed, glabrous; sheaths keeled, rather loose, mostly about as long as the internodes, the margins ciliate; blades 6–22 cm. long, 1–2.5 cm. wide, narrowed to the base, the margins usually ciliate at least at the base; racemes 3–10, ascending to spreading, densely hairy in the axils, the lower ones distant; spikelets 2.1–2.5 mm. long, elliptic, subacute; second glume and sterile lemma equal, covering the fruit, sparsely pilose.

Paspalum cymbiforme Fourn. Mex. Pl. 2: 5. 1886.

Thickets and brushy or rocky slopes, 600–1,500 meters; Jutiapa; Santa Rosa; Guatemala. Southern Mexico.

Perennial; culms in small dense clumps, erect, 50–100 cm. high, with a few branches from the middle nodes, the lower nodes bearded with erect hairs; sheaths usually longer than the internodes, glabrous, or pubescent toward the summit and sometimes on the margins; blades 7–15 cm. long, 3–7 mm. wide, attenuate, narrowed from the base, glabrous, or sometimes pubescent on the upper surface; racemes 2 or 3, 5–7 cm. long, ascending or spreading, the rachis 2–2.5 mm. wide, with a dense tuft of hairs at the base; spikelets 3 mm. long, elliptic, acute, obscured by the hairs; second glume and sterile lemma equal, the glume pilose below, stiffly ciliate on the margins, the hairs as much as 3.5 mm. long, the lemma glabrous, sparsely pubescent at the summit.

Paspalum decumbens Swartz, Prodr. Veg. Ind. Occ. 22. 1788.

P. pedunculatum Poir. in Lam. Encycl. Suppl. 4: 315. 1816. *Panicum decumbens* Roem. & Schult. Syst. Veg. 2: 429. 1817. *Paspalum vaginiflorum* Steud. Syn. Pl. Glum. 1: 19. 1854. *Dimorphostachys pedunculata* Fourn. Mex. Pl. 2: 15. 1886.

Pine ridges, open or brushy banks, margins of lakes and swamps, and wet thickets, up to 400 meters; Alta Verapaz; Izabal; Sololá; Suchitepéquez. West Indies; British Honduras to Bolivia and Brazil.

Perennial, sometimes appearing almost like an annual; culms 10–70 cm. long, freely branching, erect or usually decumbent-spreading, the ends ascending, often rooting at the lower nodes; sheaths about as long as or a little shorter than the internodes, compressed, keeled, papillose-pilose to nearly glabrous, the margins densely ciliate; ligule membranaceous, about 0.5 mm. long; blades 2–15 cm. long (usually 5–10 cm.), 6–12 mm. wide, rounded at the base, acuminate, softly pubescent on both surfaces or glabrous with a few scattered stiff hairs, the margins papillose-ciliate; peduncles 2–8 from the upper sheaths, slender, usually elongate; racemes solitary, 1–3.5 cm. long, arcuate, the rachis very narrow, pubescent at the base; spikelets paired, 1.7 mm. long, obovate, glabrous; first glume developed; second glume obtuse, about half as long as the spikelet, the sterile lemma equaling the fruit.

Paspalum dilatatum Poir. in Lam. Encycl. 5: 35. 1804. *P.*

ovatum Nees ex Trin. Gram. Pan. 113. 1826. *P. lanatum* Spreng. Syst. Veg. 4: Cur. Post 30. 1827. *P. pedunculare* Presl, Rel. Haenk. 1: 217. 1830. *P. dilatatum* var. *decumbens* Vasey, Bull. Torrey Club 13: 166. 1886. *Digitaria dilatata* Coste, Fl. France 3: 533. 1906. Commonly known as *Dallis grass*.

Adventive in the vicinity of Puerto Barrios, Izabal; probably also occurs in other departments. Native of South America from

Brazil to Argentina; introduced in United States, Central America, West Indies, and sparingly in the Eastern Hemisphere.

Perennial; culms ascending or suberect, 40–175 cm. high, simple or sparingly branched; sheaths loose, compressed, longer than the internodes, the lower ones pilose or nearly glabrous; blades as much as 45 cm. long, 3–12 mm. wide, sparsely ciliate at the base, the margins scabrous; racemes 2–11, ascending to drooping, the lower 4–11 cm. long; spikelets 2.8–3.8 mm. long, ovate, pointed; second glume and sterile lemma subequal, pointed beyond the fruit, the glume fringed with long white hairs.

Paspalum distichum L. Syst. Nat. ed. 10. 2: 855. 1759. *Digitaria paspaloides* Michx. Fl. Bor. Amer. 1: 46. 1803. *Paspalum paspaloides* Scribn. Mem. Torrey Club 5: 29. 1894.

Around ponds and along streams and ditches, up to 2,000 meters; Chiquimula; San Marcos. United States and the West Indies to Argentina; Eastern Hemisphere.

Perennial with extensively creeping stolons and slender rhizomes, the nodes of the stolons bearded, the branches erect or ascending, 6–50 cm. high; sheaths keeled, pilose on the margins toward the summit; blades 3–12 cm. long, 2–6 mm. wide, flat, acuminate, ciliate at the base, sometimes pubescent on the upper surface; racemes usually two, 1.5–7 cm. long, erect to reflexed, the rachis 1–1.5 mm. wide, scabrous on the margins; spikelets 2.5–3 mm. long, usually solitary, elliptic, abruptly acute; first glume often developed; second glume and sterile lemma equal, the glume pubescent, the lemma glabrous.

Paspalum fasciculatum Willd. ex Flugge, Monogr. Pasp. 69: 1810. *P. vaginatum* var. *pleostachyum* Doell in Mart. Fl. Bras. 2 (2): 75. 1877. *P. fasciculatum* var. *glabratum* Doell in Mart. Fl. Bras. 2 (2): 91. 1877.

Swamps and river banks, at low altitudes; Alta Verapaz; Izabal. British Honduras (Temash River); Windward Islands; Trinidad and Tobago; southern Mexico to Ecuador and Argentina.

Coarse stoloniferous perennial; culms as much as several meters long and 1 cm. thick, long decumbent-spreading, rooting at the lower nodes, usually forming tangled masses; stolons as much as 5 meters long with erect sparingly branching flowering culms 0.7–2 meters tall; nodes glabrous to densely bearded; sheaths rather loose, about as long as the relatively short internodes, nearly glabrous, the margins densely ciliate; ligule firm, about 0.7 mm. long; blades 20–60 cm. long, 1.2–3 cm. wide, acuminate, glabrous to sparsely papillose-pilose, the margins very scabrous; inflorescence flabellate, composed of 7–30 ascending to arcuate-spreading racemes, 7–17 cm. long, aggregate on a rather short stout axis; spikelets 4–5 mm. long, solitary, imbricate, elliptic, abruptly acuminate; first glume often developed; second glume and sterile lemma equal, pointed beyond the fruit, glabrous, or the margins silky-ciliate; fruit 3.7–3.8 mm. long, light brown, smooth and shining.

Paspalum hispidum Swallen, Contr. U. S. Nat. Herb. 29: 414. 1950.

Sandy ground along rivers, 400–1,800 meters; Huehuetenango (the type from Río Amelco, *Steiermark* 49670).

Perennial; culms erect or geniculate-ascending, 45–55 cm. or more long, branching, glabrous, the nodes bearded with ascending hairs; sheaths longer than the internodes, keeled but not compressed, sparsely to densely papillose-hispid, especially toward the summit, the hairs ascending or spreading; ligule membranaceous, brown, 2 mm. long; blades mostly 10–15 cm. long, 1–1.8 cm. wide, acuminate, somewhat narrowed to the rounded base, sparsely to densely papillose-hispid; inflorescence composed of 9 ascending or spreading racemes, the axis 8 cm. long; racemes 6–9 cm. long, pilose and hispid at the base, the rachis narrowly winged, 1 mm. wide, scabrous; spikelets 2.3–2.4 mm. long, 1.1 mm. wide, acute; second glume 3-nerved, pilose on the back, the margins rather densely ciliate-fringed; sterile lemma glabrous or sparsely pilose; fruit ovate-elliptic, 2 mm. long, 1 mm. wide, subacute, pale, minutely striate.

Paspalum hitchcockii Chase, Contr. U. S. Nat. Herb. 28: 160. *f. 102*. 1929.

Swampy ground, 950–990 meters; Jutiapa (*Steiermark* 30410). El Salvador; Panama; Colombia (type, *Hitchcock* 9914); Venezuela.

Perennial; culms 5–30 cm. or even 50 cm. long, creeping, rooting at the lower nodes, with ascending branches, the nodes glabrous or appressed-pubescent; sheaths compressed, glabrous or with a few hairs at the throat, usually longer than the internodes; blades 5–13 cm. long, 4–9 mm. wide, flat, somewhat rounded at the base, glabrous; racemes 2 or 3, exserted or partly included, erect or ascending, 1.5–4 cm. long, the rachis narrowly winged, 1–1.5 mm. wide, glabrous; spikelets 1.7–1.8 mm. long, obovate or suborbicular, the pedicels short, flattened; second glume and sterile lemma equal, thin, loose, irregularly wrinkled, glabrous; fruit 1.6 mm. long, reddish brown, smooth and shining.

Paspalum humboldtianum Flugge, Monogr. Pasp. 67. 1810. *P. distichophyllum* H.B.K. Nov. Gen. & Sp. 1: 86. 1815. *P. blepharophorum* Roem. & Schult. Syst. Veg. 2: 292. 1817. *Panicum obtectum* Presl, Rel. Haenk. 1: 301. 1830. *Tricholaena obtecta* Fourn. Mex. Pl. 2: 35. 1886. *Panicum humboldtianum* Kuntze, Rev. Gen. Pl. 3 (3): 361. 1898.

Pine forests and rocky hills, up to 1,500 meters; Alta Verapaz; Zacapa; Chiquimula; Santa Rosa; Guatemala; Sololá. Mexico to Panama; western South America to Argentina.

Perennial; culms 40–105 cm. high, erect from a decumbent almost woody base, commonly branching, the nodes bearded with ascending hairs; sheaths mostly longer than the internodes, sometimes crowded, papillose-hispid at least toward the summit; ligule 1–2 mm. long, dark brown; blades 8–18 cm. long, 6–15 mm. wide, acuminate, firm, stiffly spreading, the upper surface glabrous or nearly

so, the lower surface usually pubescent, also with a few scattered long hairs, the margins prominently papillose-hispid at least toward the base; racemes mostly 2-5, rarely more, 5-10 cm. long, ascending or drooping, the rachis 2-3 mm. wide with a tuft of long hairs at the base; spikelets 3.2 mm. long, solitary or paired, elliptic, acute, the glume and sterile lemma equal, fringed with long spreading glistening white hairs; fruit about 2.8 mm. long, smooth and shining.

Paspalum jaliscanum Chase, Contr. U. S. Nat. Herb. 17: 240. 1913.

Open places in pine-oak woods, 2,000-2,500 meters; Jalapa (*Steyermark* 32756). Mexico (Jalisco, *Hitchcock* 7153, type; Veracruz).

Perennial; culms 80-100 cm. high, erect from short, rather stout rhizomes, the scales rather densely pilose; sheaths papillose-pilose or nearly glabrous; blades 10-20 cm. long, 7-15 mm. wide, nearly glabrous beneath, papillose-hispid above, with long stiff hairs at the base; panicle long-exserted, bearing 5-12 ascending or spreading racemes, the lower ones 4-7 cm. long; spikelets 2.2-2.3 mm. long, elliptic, paired, the slender pedicels glabrous; second glume and sterile lemma subequal, scarcely covering the fruit, the glume papillose-pubescent, the lemma nearly glabrous.

Paspalum langei (Fourn.) Nash, N. Amer. Fl. 17: 179. 1912. *Dimorphostachys langei* Fourn. Mex. Pl. 2: 14. 1886. *Paspalum drummondii* Vasey, Contr. U. S. Nat. Herb. 3: 18. 1892. *P. oricola* Millsp. & Chase, Field Mus. Bot. 3: 28. f. 28, 29. 1903. *P. ciliiferum* Hitchc. Contr. U. S. Nat. Herb. 12: 201. 1909.

Damp thickets, moist woods, and roadsides, sometimes a weed in cultivated ground, up to 1,500 meters; Petén; Jutiapa; Guatemala. British Honduras (El Cayo District); Florida, Louisiana, and Texas; eastern Mexico to Nicaragua; Cuba; Haiti; Venezuela.

Perennial; culms slender, tufted, 30-60 cm. or frequently as much as 1 meter high, compressed; blades flat, 10-40 cm. long, 6-15 mm. wide, often tapering to a narrow base, glabrous or papillose-hispid, sparsely ciliate; racemes 2-5 (sometimes more), slender, spreading, rather distant, the rachis with a few long hairs at the base; spikelets in pairs, 2.2-2.6 mm. long; first glume usually well developed; second glume and sterile lemma finely pubescent, glandular-spotted, the glume a little shorter than the lemma; fruit exposed at the summit at maturity.

Paspalum lentiginosum Presl, Rel. Haenk. 1: 218. 1830.

Moist open ground, in swamps, and along ditches 1,350-1,500 meters; Alta Verapaz; Guatemala. Western Mexico (Sonora, Sinaloa, Morelos, Colima).

Perennial; culms in small tufts, erect or ascending, 75-140 cm. tall, glabrous, compressed; sheaths loose, keeled, mostly overlapping, glabrous or sparsely

papillose or papillose-hispid, more or less hairy on the collar; blades 12–25 cm. long, 8–14 mm. wide, flat, with a few long hairs at the base, the margins scabrous; racemes mostly 5–13, ascending or spreading, the lower 5–7 cm. long, the rachis slender with a few long hairs at the base; spikelets 1.7–1.9 mm. long, in pairs on slender pedicels, subhemispheric or broadly elliptic; second glume and sterile lemma equal, just covering the fruit, the glume finely papillose-pubescent, the lemma nearly glabrous.

***Paspalum ligulare* Nees, Agrost. Bras. 60. 1829.**

In water of swampy places, Ciénaga de Lagartero, below Miramar, Huehuetenango, 300 meters, *Steyermark* 51517. Brazil.

Perennial; culms densely tufted, erect or nearly so, as much as 120 cm. high; sheaths compressed, glabrous or more or less hispid on the margins toward the summit; ligule 2–5 mm. long; blades as much as 25 cm. long, 2–6 mm. wide, attenuate, sometimes flexuous, sparsely hispid toward the base, the margins scabrous; racemes 2–6, rather stiffly ascending, 8–15 cm. long; spikelets paired, elliptic or obovate-elliptic, about 2.5 mm. long; glume and sterile lemma glabrous, covering the fruit.

***Paspalum lividum* Trin. in Schlecht. Linnaea 26: 383. 1854.**

Moist or wet savannas and along ditches up to 1,500 meters; Alta Verapaz; Guatemala. Alabama, Louisiana, Texas; Mexico; Cuba; Venezuela; Ecuador to Peru and Argentina.

Perennial; culms creeping or ascending from a decumbent base, 30–100 cm. long, rooting at the lower nodes, compressed, glabrous; sheaths usually as long as or longer than the internodes, loose, keeled, glabrous, or pilose toward the summit; blades commonly 15–25 cm. long, 3–6 mm. wide, conduplicate at the base, sometimes obscurely pubescent above; racemes 3–10, 1.5–5 cm. long, arranged on a slender flexuous axis, ascending, densely flowered; spikelets 2–2.5 mm. long, obovate; second glume and sterile lemma equal, minutely pointed beyond the fruit, usually deep purple, glabrous.

***Paspalum microstachyum* Presl, Rel. Haenk. 1: 215. 1830.**

P. effusum Nees, Jour. Bot. Kew Misc. 2: 104. 1850. Not *P. effusum* Rasp. 1825. *P. cognatissimum* Steud. Syn. Pl. Glum. 1: 18. 1854.

Moist thickets, roadsides, and waste places, at low altitudes; Alta Verapaz (*Goll* 78). Honduras to Peru; Brazil.

Annual; culms slender, 20–135 cm. high, erect from a usually geniculate base, sometimes rooting at the lower nodes, branching at the lower and middle nodes; sheaths mostly much shorter than the internodes, keeled, glabrous to papillose-pilose; ligule about 0.3 mm. long; blades 3–30 cm. long, 6–20 mm. wide, thin, the lower tapering to a narrow base, the upper ones rounded to cordate, glabrous to papillose-pilose on both surfaces, the margins scabrous, papillose-ciliate toward the base; panicles terminal and axillary, composed of 6–35 slender solitary or fascicled, ascending or arcuate-spreading racemes, the lower ones 3–8 cm. long,

rather distant, the upper ones gradually approximate and shorter; rachis narrowly winged, 0.5–0.6 mm. wide, with scattered long white hairs on the margins; spikelets 1.5–1.6 mm. long, paired, on long slender pedicels, elliptic, subacute; second glume and sterile lemma equal, thin, softly and rather densely pubescent; fruit 1.5 mm. long, smooth and shining.

Paspalum millegrana Schrad. in Schult. Mant. 2: 175. 1824.
P. karwinskyi Fourn. Mex. Pl. 2: 8. 1886. *P. underwoodii* Nash,
Bull. Torrey Club 30: 375. 1903.

Swamps and moist open ground, British Honduras. Not known from Guatemala. Eastern Mexico; Honduras; El Salvador; West Indies; Venezuela to French Guiana and Brazil.

Perennial; culms erect or ascending in large tough clumps, 1–2 meters high, glabrous; lower leaves crowded toward the base, the sheaths loose, spongy, reticulate-veined; blades firm, flat, folded at the base, loosely rolled in drying, mostly 30–75 cm. long, 7–15 mm. wide, pubescent or glabrous above, scabrous beneath, the margins sharply serrulate; racemes several to many, approximate or somewhat distant, ascending or spreading, mostly 8–12 cm. long; spikelets in pairs, obovate, 2–2.4 mm. long; second glume and sterile lemma equal, scarcely covering the fruit, firm, glabrous.

Paspalum minus Fourn. Mex. Pl. 2: 6. 1886.

Damp meadows and clearings in forests, up to 1,500 meters; Alta Verapaz; Izabal; Jalapa. Texas; central Mexico and the West Indies to Peru and Paraguay.

Perennial, similar in aspect to *P. notatum*; culms 10–40 cm. high, more slender than *P. notatum*; sheaths keeled, glabrous, the margins papillose-ciliate at least toward the summit; blades 3–15 cm. long, 2–6 mm. wide, abruptly acute, the margins sparsely papillose-ciliate; racemes 2, conjugate, rarely 3, 3–7 cm. long, slender, narrowly ascending to spreading; spikelets 2–2.5 mm. long, ovate, less shining than those of *P. notatum*.

Paspalum multicaule Poir. in Lam. Encycl. Suppl. 4: 309. 1816. *P. papillosum* Spreng. Nov. Prov. Hal. 47. 1819. *P. horticola maritimum* Salzm. ex Doell in Mart. Fl. Bras. 2 (2): 54. 1877.

Sandy pinelands and savannas, at low altitudes. Toledo and El Cayo districts, British Honduras. Not known from Guatemala. Southern Mexico; Nicaragua to Panama; West Indies; northern South America.

Annual; culms slender, densely tufted, freely branching from the lower nodes, ascending or spreading, mostly 10–30 cm. high, sometimes depauperate or rarely as much as 60 cm. high; sheaths usually longer than the internodes, keeled, glabrous or more or less pilose, the margins often ciliate, especially toward the summit; blades 2–15 cm. long, 1.5–2.5 mm. wide, from nearly glabrous to densely short

pubescent, usually papillose-pilose as well; racemes 2, rarely 1 or 3, conjugate, divergent, 1.5-6 cm. long; spikelets 1.2-1.5 mm. long, subhemispheric, solitary, from glabrous to rather densely bearded with subglobular hairs; second glume and sterile lemma equal, covering the fruit, or the glume rarely reduced or wanting; fruit about the size of the spikelet, minutely striate.

Paspalum notatum Flugge, Monogr. Pasp. 106. 1810. *P. taphrophyllum* Steud. Syn. Pl. Glum. 1: 19. 1854. *P. saltense* Arech. Anal. Mus. Nac. Montevideo 1: 53. 1894.

Open ground and savannas, up to 1,500 meters; Alta Verapaz; Santa Rosa; Guatemala. Southern United States (introduced); Mexico and the West Indies to Argentina.

Rhizomatous perennial forming dense sods; culms 15-50 cm. high, flattened, glabrous; leaves crowded toward the base, the lower sheaths short, overlapping, those of the culm few, elongate; sheaths keeled, compressed, glabrous or sometimes pubescent, the margins often ciliate toward the summit; ligule very short, membranaceous; blades 2-30 cm. long, 3-10 mm. wide, glabrous, the margins ciliate at least toward the base; racemes 2 or rarely 3, 2.5-12 cm. long, subconjugate, ascending, more or less arcuate, the rachis about 1 mm. wide; spikelets 2.5-3.8 mm. long, solitary, ovate or obovate; glume and sterile lemma equal, firm, smooth and shining; fruit 2.5-3.5 mm. long, oval.

Paspalum nutans Lam. Tabl. Encycl. 1: 175. 1791. *P. curvistachyus* Raddi, Agrost. Bras. 26. 1823. *Paspalus singularis* Link, Hort. Berol. 1: 48. 1827. *P. lloydii* Nash, N. Amer. Fl. 17: 178. 1912.

Damp thickets, forests, and sandy seashores, up to 1,000 meters; Izabal; Chimaltenango; Retalhuleu. British Honduras (El Cayo District); Leeward Islands; Honduras to Colombia, French Guiana, and Brazil.

Perennial; culms 25-90 cm. long, erect from a decumbent base, spreading or creeping, freely branching, rooting at the lower nodes; sheaths shorter than the internodes or the lower ones overlapping, compressed, keeled, glabrous, the margins usually ciliate; blades 4-16 cm. long, 5-15 mm. wide, lanceolate, acuminate, rounded at the base, glabrous or pubescent, with a few coarse hairs on the upper surface at the base, the margins scabrous and often more or less papillose-ciliate; peduncles 1-4 from the terminal sheaths, finally elongate; racemes 1-5, 2-6 cm. long, arcuate, the rachis narrow, glabrous, slightly flexuous, with a few long hairs at the base; spikelets paired, 1.8-2 mm. long, obovate, glabrous; first glume usually obsolete; second glume obtuse, about three-fourths as long as the spikelet; fruit as long as the sterile lemma, pale, striate.

Paspalum orbiculatum Poir. in Lam. Encycl. 5: 32. 1804. *P. pusillum* Vent. ex Flugge, Monogr. Pasp. 100. 1810. *P. serpens* Presl ex Trin. Gram. Pan. 102. 1826. *P. lenormandi* Husn. Enum. Glum. 12. 1871.

Moist places on sandy or clay banks, stream margins, and along trails in forests, at low altitudes; Petén; Alta Verapaz; Izabal. British Honduras; southern Mexico and the West Indies to Ecuador, Brazil, and Paraguay.

Stoloniferous perennial; culms 10–60 cm. long, slender, creeping, rooting at the nodes, the ascending branches 10–25 cm. long, the internodes usually short, the nodes glabrous or appressed-pubescent; sheaths usually shorter than the internodes, compressed, glabrous, the margins ciliate toward the summit; blades 1–6 cm. long, 1.5–7 mm. wide, spreading, glabrous or minutely pubescent; racemes 2–7, approximate, ascending or spreading, 1–2 cm. or rarely 3 cm. long, the rachis narrowly winged, 0.5–0.8 mm. wide, the peduncle included or short-exserted; spikelets 1–1.2 mm. long, ovoid, minutely pointed, glabrous or rarely pubescent, greenish-golden, the margins of the sterile lemma somewhat raised; fruit 0.9–1 mm. long, smooth and shining.

Paspalum paniculatum L. Syst. Nat. ed. 10. 2: 855. 1759. *P. hemisphericum* Poir. Encycl. 5: 31. 1804. *P. strictum* Pers. Syn. Pl. 1: 86. 1805. *Paspalum compressicaulis* Raddi, Agrost. Bras. 29. 1823. *Paspalum paniculatum* β *rigidum* Schlecht. ex Fourn. Mex. Pl. 2: 9. 1886. *P. cordovense* Fourn. Mex. Pl. 2: 9. 1886. *Zacate*.

Open slopes, swamps, openings in forests, along ditches, often in cultivated places, usually at low altitudes, rarely up to 1,500 meters; Alta Verapaz; Izabal; Santa Rosa; Huehuetenango; Suchi-tepéquez; Quezaltenango; San Marcos. British Honduras; Mexico and the West Indies to Argentina; also in West Africa, the Society Islands, and Queensland, Australia, probably introduced.

Perennial; culms densely tufted, 0.3 to more than 2 meters high, coarse, leafy, erect or ascending, sometimes decumbent at the base and rooting at the lower nodes, finally branching, the nodes glabrous to conspicuously bearded with stiff ascending hairs; sheaths mostly longer than the internodes, keeled, papillose-hispid, sometimes only on the collar and along the margins, colored orange-brown on the inner surface; ligule 1–3 mm. long; blades 9–50 cm. long, 6–25 mm. wide, usually rounded at the base, densely hispid on both surfaces to nearly glabrous, with a tuft of long hairs on each side at the base, the margins scabrous, more or less hispid-ciliate; inflorescence 5–30 cm. long, composed of 7–60 approximate, solitary or somewhat fascicled racemes, the lower ones 4–12 cm. long, ascending or arcuate-spreading; spikelets paired, 1.3–1.5 mm. long, densely crowded; second glume and sterile lemma equal, barely covering the fruit, softly pubescent, the sterile lemma woolly pubescent only on the margins.

Paspalum peckii Hubb. Proc. Amer. Acad. 49: 495. 1913.

Known only from the type collected on pine ridges at Manatee Lagoon, Belize District, British Honduras (*Peck* 71).

Perennial; culms tufted, erect, about 75 cm. high, the nodes sparsely pubescent; sheaths keeled, overlapping, glabrous except the pilose margins; blades long-acuminate, 14–30 cm. long, 5–8 mm. wide, sparsely puberulent on both surfaces; racemes 2 or 3, falcate, 6–13 cm. long, the rachis about 2 mm. wide; spikelets paired, 2.7 mm. long, glabrous; first glume of the primary spikelet obsolete or nearly so, that of the secondary as much as half the length of the spikelet; second glume shorter than the fruit, the sterile lemma slightly exceeding it.

Paspalum pectinatum Nees in Trin. Gram. Icon. 1: *pl.* 117. 1828. *Anastrophus pectinatus* Schlecht. ex Jacks. Ind. Kew. 1: 118. 1893.

Sandy pinelands, Toledo and El Cayo districts, British Honduras. Not known from Guatemala. Southern Mexico (Oaxaca); Honduras; Costa Rica; Panama; Colombia to Surinam and southern Brazil.

Perennial; culms in coarse tufts 30–100 cm. high, simple, erect, glabrous; lower sheaths crowded, firm, reddish, harshly villous toward the summit, smooth and shining toward the base; ligule firm, about 1 mm. long; blades 12–60 cm. long, 3–5 mm. wide, the uppermost reduced, erect or nearly so, densely harshly villous; racemes usually 2, sometimes 1 or 3, erect or ascending, 4–8 cm. long, the rachis 1.8–2.3 mm. wide, the margins irregular, densely villous with rather coarse hairs at the base; spikelets 4.5–6 mm. long, solitary, imbricate; glume and sterile lemma flat, cordate-lanceolate, the sterile lemma narrower and shorter than the glume, sparsely tuberculate-hispid on the back, the thickened margins tuberculate-ciliate with stiff spreading hairs 2–3 mm. long; fruit 4.2–4.5 mm. long, lanceolate, obtuse, the lemma and palea rather thin, the lemma shortly ciliate toward the summit.

Paspalum pilosum Lam. Tabl. Encycl. 1: 175. 1791. *Panicum monostachyum* H.B.K. Nov. Gen. & Sp. 1: 96. 1815. *Dimorphostachys monostachya* Fourn. Mex. Pl. 2: 14. 1896. *D. pilosa* Fourn. Mex. Pl. 2: 14. 1886.

Sandy pine uplands, Mountain Pine Ridge, El Cayo District, British Honduras, locally abundant. Not known from Guatemala. Costa Rica; Panama; Colombia to Bolivia and Brazil.

Perennial; culms 40–115 cm. high, erect or ascending, simple or sparingly branched from the middle nodes, the nodes densely short pubescent or nearly glabrous; sheaths shorter than the internodes, keeled, from glabrous to papillose-pilose, hairy on the collar, the margins rather densely ciliate; ligule membranaceous, 1–1.5 mm. long; blades 10–40 cm. long, 3–10 mm. wide, stiff, somewhat spreading, densely pilose on both surfaces, the hairs rather stiff, the margins scabrous; peduncles 1–4, from the upper and middle sheaths, elongate or almost included; racemes solitary, 6–17 cm. long, arcuate, the rachis narrowly winged, the margins scabrous, more or less ciliate; spikelets paired, crowded, 2.6–3 mm. long, elliptic, glabrous; first glume small or as much as half as long as the spikelet, rarely obsolete; second glume and sterile lemma firm, subequal, or the second

glume a little shorter, exposing the fruit, the lemma enclosing a palea and sometimes a staminate flower.

Paspalum plenum Chase, Contr. U. S. Nat. Herb. 28: 202. *f.* 122. 1929.

Wet ground and grassy places around lakes, 1,350–1,600 meters; Alta Verapaz; Jalapa. Southern Mexico; Honduras; Costa Rica; Colombia; Venezuela; Peru.

Robust perennial; culms in large clumps, simple, erect, 1–2.5 meters high; sheaths much longer than the internodes, glabrous, or hairy on the margins and on the collar, the lower ones loose, spongy, strongly reticulate, at least in drying; blades 30–90 cm. long, or the uppermost shorter, 1.5–2.5 cm. wide, acuminate or attenuate, strongly hispid-serrate on the margins; panicle erect or nodding, 18–40 cm. long, with numerous, rather crowded, ascending to finally drooping racemes, the lower ones 8–18 cm. long, gradually shorter upward; rachis 1.2–1.5 mm. wide, ciliate with long stiff hairs; spikelets 2.5–3 mm. long, obovate-elliptic, usually dark purple; second glume and sterile lemma equal, thin, acutish, the glume pubescent on the margins and toward the summit, the lemma glabrous or nearly so.

Paspalum plicatum Michx. Fl. Bor. Amer. 1: 45. 1803. *P. undulatum* Poir. in Lam. Encycl. 5: 29. 1804. *P. lenticulare* H.B.K. Nov. Gen. & Sp. 1: 92. 1815. *P. montevidense* Spreng. Syst. Veg. 1: 246. 1825. *P. antillense* Husnot, Bull. Soc. Linn. Norman. II. 5: 260. 1871. *P. pauperculum* Fourn. Mex. Pl. 2: 10. 1886. *P. pauperculum* var. *altius* Fourn. Mex. Pl. 2: 10. 1886.

Open banks, wet thickets, pine and oak woods, pastures, and waste places, up to 1,600 meters; Petén; Alta Verapaz; Izabal; Zacapa; Chiquimula; Jalapa; Santa Rosa; Guatemala; Sololá; Huehuetenango; Retalhuleu. Southeastern United States and the West Indies to Argentina.

Perennial; culms in small tufts, mostly 0.5–1 meter high, erect or ascending, simple or sparingly branched, glabrous; sheaths longer than the internodes, keeled, glabrous or sparsely papillose-pilose; ligule 2–3 mm. long, brown, truncate; blades as much as 50 cm. long, 3–10 mm. wide, firm, flat, or folded, glabrous or sparsely papillose-pilose on the upper surface, especially along the margins; racemes few to several, usually arcuate-spreading, 2–10 cm. long with a tuft of long hairs at the base, these sometimes nearly wanting; spikelets 2.5–2.8 mm. long, paired, glabrous or appressed-pubescent, the sterile lemma cross-wrinkled near the margins; fruit dark brown, smooth and shining.

Paspalum pulchellum Kunth, Mem. Mus. Hist. Nat. 2: 68. 1815. *Reimaria elegans* Humb. & Bonpl. ex Flugge, Monogr. Pasp. 216: 1810. Not *Paspalum elegans* Flugge. *P. arenicolum* C. Muell. Bot. Zeit. 19: 325. 1861.

Savannas and open pine ridges; Petén; Izabal. British Honduras (Belize and Toledo districts); West Indies; Venezuela to French Guiana and northern Brazil.

Perennial; culms in small dense clumps, very slender, erect, 25–70 cm. high; lower sheaths crowded, overlapping, the upper ones much shorter than the elongate internodes; blades flat, becoming involute, attenuate, as much as 20 cm. long, 1–4 mm. wide, pilose, the uppermost much reduced; racemes 2–4, 2–9 cm. long, erect or ascending, the rachis with a dense tuft of hairs at the base; spikelets 1.7–2 mm. long, solitary, the glumes wanting, the sterile lemma equaling the fruit, glabrous, usually purple-tinged.

Paspalum repens Bergius, Act. Helv. Phys. Math. 7: 129. pl. 7. 1762. *P. gracile* Rudge, Pl. Guian. 20. pl. 26. 1805. *P. pyramidale* Nees, Agrost. Bras. 77. 1829. *Cymatochloa repens* Schlecht. Bot. Zeit. 12: 822. 1854. *C. pyramidalis* Schlecht. ex Doell in Mart. Fl. Bras. 2 (2): 98. 1877.

In water around Lago Guija, Jutiapa (*Steiermark* 31826). British Honduras; southern Mexico (Tabasco); Jamaica, and Trinidad to Peru, Brazil, and northern Argentina.

Aquatic perennial; culms submerged, spongy, with long roots at the nodes and numerous floating branches, the nodes glabrous or sometimes hispid; sheaths longer than the internodes, inflated except the uppermost on the branches, soft, papery, glabrous or sparsely papillose-hispid, auriculate; ligule 1–2 mm. long, brown; blades 10–27 cm. long, 1.2–2.5 cm. wide, thin, flat, scabrous; panicles 10–20 cm. long, shortly exserted; racemes numerous, mostly 3–5 cm. long, spreading or even reflexed, the rachis about 1.5 mm. wide, scabrous, acuminate, extending beyond the spikelets, naked for a short distance at the base; spikelets 1.7–2 mm. long, solitary, somewhat crowded, whitish, glabrous; glume and sterile lemma thin, pointed beyond the fruit.

Paspalum scabrum Scribn. U. S. Dept. Agr. Div. Agrost. Bull. 4: 36. pl. 3. 1897.

Known in Guatemala only from the type, from Chupadero, Santa Rosa (*Heyde & Lux* 1892). Colombia; Venezuela; Ecuador; Bolivia.

Annual; culms elongate, ascending or spreading, branching, strongly retrorsely scabrous, the nodes densely retrorsely bearded with short hairs; sheaths loose, scabrous, those of the branches longer than the internodes; blades 5–10 cm. long, 1–2.4 cm. wide, lanceolate-elliptic, papillose-hispid; panicles 11–20 cm. long, composed of numerous subfascicled racemes, these 1.5–5 cm. long, spreading, falling entire, the rachis about 2 mm. wide, scabrous; spikelets 1.8–1.9 mm. long, solitary, somewhat distant, oblong-elliptic; second glume wanting; sterile lemma as long as the fruit, thin, whitish, glabrous.

Paspalum serpentinum Hochst. ex Steud. Syn. Pl. Glum. 1: 22. 1854. *P. argyrocondylon* Steud. Syn. Pl. Glum. 1: 22. 1854.

P. maculosum var. *rotundiflorum* Doell in Mart. Fl. Bras. 2 (2): 72. 1877.

Pinelands, Baker's Pine Ridge, Belize District, British Honduras, the only record from North America. Trinidad; Venezuela; British Guiana; Surinam; Brazil (Pará and Maranhão).

Perennial; culms tufted, erect, 55–65 cm. tall; sheaths pilose, the lowermost densely appressed-villous; blades erect, flat, becoming involute, 10–20 cm. long, 1–3 mm. wide, papillose-pilose, the upper ones greatly reduced; racemes 2 (rarely 1), approximate, 4–6 cm. long, narrowly ascending; spikelets solitary, 2.5 mm. long, subcircular, variously spotted or lined with reddish brown; second glume and sterile lemma equal, slightly exceeding the fruit, glabrous.

Paspalum squamulatum Fourn. Mex. Pl. 2: 11. 1886. *P. sumichrasti* Fourn. Mex. Pl. 2: 11. 1886.

Oak woods, wet thickets, shady ravines, meadows and open banks, 500–1,600 meters; Alta Verapaz; Jalapa; Guatemala; Sololá; Chimaltenango; Suchitepéquez. Mexico; Nicaragua; Costa Rica; Panama.

Perennial; culms at first erect, straggling, branching, rooting at the lower nodes, 15–90 cm. long; sheaths shorter than the internodes, loose, ciliate on the margins, usually pubescent on the collar; blades 5–15 cm. long, 3–15 mm. wide, narrowed toward the rounded base, pilose or papillose-pilose to nearly glabrous; racemes 2–13, usually 5–6, 1.5–6 cm. long, ascending or spreading, the lower somewhat distant, the upper approximate; spikelets 1.6–1.9 mm. long, elliptic-obovate, obtuse, glabrous; second glume and sterile lemma obtuse, 3-nerved, the glume shorter than the fruit, the lemma equaling the fruit.

Paspalum stellatum Humb. & Bonpl. in Flugge, Monogr. Pasp. 62. 1810. *Paspalum stellatus* var. *monostachyus* Nees, Agrost. Bras. 78. 1829. *Paspalum splendens* var. *sphacelatum* Hack. Oesterr. Bot. Zeitschr. 51: 239. 1901.

Dry, rocky, grassy or pine-clad slopes, 250–1,000 meters; Zacapa; Jalapa. Hispaniola; southern Mexico to Argentina.

Perennial; culms 40–80 cm. high, erect, simple, glabrous or appressed-pubescent toward the summit; sheaths mostly longer than the internodes, the lower papillose-hirsute, the upper nearly glabrous; ligule membranaceous, ciliate, about 0.5 mm. long; blades 8–25 cm. long, 2–3 mm. wide, the uppermost reduced, involute-setaceous or flat toward the base, papillose-pilose or the lower surface glabrous; racemes 2.5–10 cm. long, solitary or paired, ascending, the rachis 5–7 mm. wide, golden brown or purplish, the short peduncle pubescent; spikelets about 3 mm. long, solitary, closely imbricate on short radiately pilose pedicels; glume and sterile lemma subequal, the margins fringed with white hairs, those on the upper half much exceeding the spikelet; fruit 2 mm. long, minutely stipitate, smooth and shining.

Paspalum tenellum Willd. Enum. Pl. 89. 1809. *P. elegans* Flugge, Monogr. Pasp. 183. 1810. *P. pubescens* Lag. Gen. & Sp. Nov. 2. 1816. *P. lagascae* Roem. & Schult. Syst. Veg. 2: 317. 1817. *P. liebmanni* Fourn. Mex. Pl. 2: 11. 1886.

Moist thickets, grassy plains, rocky slopes, and along ditches and roadsides, 1,300–2,100 meters; Alta Verapaz; Guatemala; Chimaltenango. Mexico; El Salvador; Colombia; Ecuador; Brazil.

Perennial; culms erect or ascending from a rather hard knotty base, mostly 30–100 cm. high, simple or finally sparingly branched from the lower nodes; sheaths usually shorter than the elongate internodes, sparsely to densely papillose-pilose; blades 8–25 cm. long, 8–21 mm. wide, rounded at the base, sparsely to densely papillose-pilose, the uppermost greatly reduced; inflorescence long-exserted, of 3–17 ascending to spreading, rather thick racemes, the lower 2–8 cm. long; spikelets 1.9–2.1 mm. long, obovate-elliptic, paired, crowded; second glume and sterile lemma equal, covering the fruit, densely papillose-pubescent, becoming tinged with purple.

Paspalum tinctum Chase, Contr. U. S. Nat. Herb. 28: 62. 1929.

Along pool in meadow along creek, "Los Pinitos," just southeast of Huehuetenango, Dept. Huehuetenango, 2,000 meters, *Steyermark* 48144. Central and southern Mexico.

Perennial; culms rather coarse, erect or somewhat decumbent at the base, 1–1.5 meters high, glabrous; sheaths compressed, longer than the internodes, pubescent on the margins toward the summit or glabrous; blades 15–40 cm. long, 4–7 mm. wide, conduplicate at the base, sparsely pilose on the upper surface or glabrous; panicles 15–25 cm. long, composed of 9–20 ascending or spreading, somewhat flexuous racemes, the lower ones 5–7 cm. long, the others gradually shorter; rachis 1.5–2 mm. wide, dark green or purple; spikelets 2.8–3 mm. long, densely imbricate, elliptic-obovate; glume and sterile lemma equal, green tinged with purple, sparsely pubescent to nearly glabrous; fruit 2.6 mm. long, elliptic, pale, smooth.

Paspalum trachycoleon Steud. Syn. Pl. Glum. 1: 28. 1854.

Open or brushy slopes, 700 meters; Alta Verapaz (Piedra Blanca de Qualan, *Pittier* 1788). Type from Venezuela (*Funck* 742). Honduras; El Salvador; Colombia; Venezuela; Brazil.

Perennial; culms clambering or trailing, 1–2 meters long, somewhat woody, branching, the nodes bearded; sheaths shorter than the internodes, papillose-hirsute or the upper nearly glabrous; blades 10–18 cm. long, 8–15 mm. wide, acuminate, softly pubescent on both surfaces; racemes 5–14, approximate, 3–6 cm. long, ascending, the rachis 4–5 mm. wide, thin, reticulate-veined; spikelets 2.2–2.5 mm. long, imbricate, abruptly pointed; second glume and sterile lemma equal, about as long as the fruit, the glume pilose on the back, the margins densely

ciliate, some of the hairs toward the summit much longer and coarser than the others, the lemma glabrous; fruit acuminate, pilose at the tip.

Paspalum urvillei Steud. Syn. Pl. Glum. 1: 24. 1854. *P. larranagai* Arech. Anal. Mus. Nac. Montevideo 1: 60. *pl.* 2. 1894. *P. vaseyanum* Scribn. U. S. Dept. Agr. Div. Agrost. Bull. 17: 32. *f.* 328. 1899. *Vasey grass*. Figure 79.

Along ditches around Puerto Barrios, Izabal, undoubtedly introduced. Brazil to Argentina; introduced in southeastern United States, southern California, Cuba, Hawaiian Islands, and various South American countries.

Perennial; culms in small to large clumps, as much as 2.5 meters high; sheaths keeled toward the summit, the lower ones hirsute or nearly glabrous; blades mostly 15–30 cm. long, 3–15 mm. wide, densely long-pilose at the base, the margins scabrous; racemes 6–25, ascending to drooping, the lower 7–14 cm. long, the upper gradually shorter; spikelets 2–3 mm. long, ovate, abruptly acute; second glume and sterile lemma equal, pointed beyond the fruit, both conspicuously fringed with long white hairs, otherwise pilose or the lemma nearly glabrous.

Paspalum vaginatum Swartz, Prodr. Veg. Ind. Occ. 21. 1788. *Digitaria foliosa* Lag. Gen. & Sp. Nov. 4. 1816. *Paspalum tristachyum* LeConte, Jour. de Phys. Chym. 91: 285. 1820. *P. foliosum* Kunth, Rév. Gram. 1: 25. 1829. *P. kleineanum* Presl, Rel. Haenk. 1: 209. 1830. *P. inflatum* A. Rich. in Sagra, Hist. Cuba 11: 298. 1850. *P. distichum* var. *vaginatum* Swartz ex Griseb. Fl. Brit. W. Ind. 541. 1864. *P. vaginatum* var. *nanum* Doell in Mart. Fl. Bras. 2 (2): 75. 1877. *P. reimarioides* Chapm. Fl. South. U. S. 665. 1883.

Moist, sandy lake shores and seacoasts, near sea level; Izabal; Chiquimula; San Marcos. Southeastern United States and Baja California to Argentina and Chile; West Indies; tropics and subtropics of the Eastern Hemisphere.

Rhizomatous stoloniferous perennial; culms 10–60 cm. high, erect or ascending, strongly compressed, simple or branching, glabrous; stolons as much as 1 meter long, slender to rather stout with short internodes, the sheaths bladeless or with short reflexed blades; sheaths of the culms longer than the internodes, loose, keeled, pilose in the throat; ligule membranaceous, about 0.5 mm. long; blades 2.5–15 cm. commonly about 10 cm. long, 3–8 mm. wide, narrower than the mouth of the sheath, gradually narrowed to a more or less involute tip, conspicuously distichous; racemes usually 2, sometimes 3–5, 1.5–7.5 cm. long, conjugate or approximate, erect to spreading or reflexed, somewhat falcate; spikelets 3–4.5 mm. long, solitary, imbricate, acute, glabrous; first glume rarely developed; second glume and sterile lemma equal, thin, the lemma transversely undulate; fruit 2.5–3 mm. long, obovate, acute.



FIG. 79. *Paspalum urvillei*. Plant, $\times \frac{1}{2}$; two views of spikelet, and floret, $\times 10$.

Paspalum virgatum L. Syst. Nat. ed. 10. 2: 855. 1759. *P. leucocheilum* Wright, Anal. Acad. Cienc. Habana 8: 203. 1871; Fl. Cub. 194. 1873. *P. lagascae* var. *virgatum* Kuntze, Rev. Gen. Pl. 3 (3): 362. 1898.

Swamps, brackish marshes, and moist banks, up to 900 meters; Alta Verapaz; Izabal; Chiquimula; Jutiapa; Santa Rosa; Escuintla. British Honduras; Texas, Mexico, and the West Indies to Argentina.

Coarse leafy perennial; culms in large clumps, 1-2 meters high, erect, simple; sheaths longer than the internodes, glabrous or sparsely hirsute on the collar and along the margins, the upper keeled, the lower ones spongy reticulate, purplish; ligule 1.5-2 mm. long; blades 30-75 cm. long, 1-2 cm. wide, firm, flat, the margins serrulate; inflorescence 12-40 cm. long, composed of few to many thick ascending to drooping racemes, the lower ones mostly 10-15 cm. rarely 20 cm. long; rachis 1-1.5 mm. wide with a tuft of long hairs at the base, the margins very scabrous; spikelets 2.2-3 mm. long, paired, crowded, obovate, abruptly pointed, glabrous or pubescent, with silky hairs on the margins especially toward the summit; fruit 2-2.2 mm. long, chestnut-brown, striate.

PENNISETUM L. Rich.

Spikelets solitary or in groups of 2 or 3, the groups enclosed in a fascicle of bristles, these united only at the base, often plumose, falling attached to the spikelets; first glume much shorter than the spikelet, sometimes minute or wanting, thin, 1-nerved; second glume and sterile lemma subequal, or the glume a little shorter, 5-nerved; fruit subindurate, smooth and shining, the margins of the lemma thin and flat.

Annuals or perennials, sometimes rather woody, with flat blades and dense spikelet panicles.

Species about 80, in the tropics and subtropics of both hemispheres.

Spikelets 2 or more in each fascicle.

Innermost bristle of the fascicle much stouter and longer than the others, 2-5 cm. long. *P. vulcanicum*.

Innermost bristle not conspicuously stouter and longer than the others, not more than 2 cm. long. Introduced species. *P. purpureum*.

Spikelets solitary in each fascicle.

Culms sparingly branching; panicles terminal on the main culm and branches only.

Bristles conspicuously plumose. *P. setosum*.

Bristles not plumose.

Sterile lemma enclosing a palea and sometimes a staminate flower; innermost bristle stouter and longer than the others. *P. complanatum*.

Sterile lemma empty; innermost bristle not stouter and longer than the others. *P. nervosum*.

Culms freely branching; panicles terminal and axillary, usually numerous.

Bristles numerous, about twice as long as the spikelets; sterile lemma enclosing a well-developed palea and usually a staminate flower. . . *P. bambusiforme*.

Bristles few, most of them not exceeding the spikelet; sterile lemma empty.
P. distachyum.

Pennisetum bambusiforme (Fourn.) Hemsl. ex Jacks. Ind. Kew. 2: 458. 1894. *Gymnothrix bambusiformis* Fourn. Mex. Pl. 2: 48. 1886. *Pennisetum tristachyum* var. *bambusiforme* Leeke, Zeitschr. Naturw. 79: 33. 1907.

Wet thickets, damp forests, moist banks, and rocky slopes, 1,200–2,800 meters; Alta Verapaz; Zacapa; Chimaltenango; Sololá; Quezaltenango; San Marcos. Southern Mexico; El Salvador; Honduras; Costa Rica; Colombia and Venezuela to Peru.

Perennial; culms commonly 1–2 meters or sometimes as much as 6 meters high, freely branching from the upper nodes, the branches in small fascicles, repeatedly branching; blades of the main culm 20–35 cm. long, 2–3.5 cm. wide, narrowed toward the base, pilose or sometimes scabrous or nearly glabrous, those of the ultimate branches much smaller; panicles 5–12 cm. long, about 1 cm. wide, pale tinged with purple, the peduncles slender, flexuous; fascicles ascending, scarcely crowded, the bristles slender, very unequal, mostly about twice the length of the spikelet; spikelets 5–6 mm. long, scabrous; first glume minute, obtuse, the second about one-third the length of the spikelet; sterile lemma longer than the fruit, attenuate, enclosing a well-developed palea and usually a staminate flower; fruit 4.5–5 mm. long, acuminate, scabrous.

Pennisetum ciliare (L.) Link, Hort. Berol. 1: 213. 1827. *Cenchrus ciliaris* L. Mant. Pl. 302. 1771.

This species has been reported from Guatemala, based on a specimen collected on rocky slopes at El Obraje, Zacapa, Pittier 1751. It is not the African species, but seems to be related to *P. karwinskyi* Schrad. It may represent a distinct species.

Pennisetum complanatum (Nees) Hemsl. Biol. Centr. Amer. Bot. 3: 507. 1885. *Gymnothrix complanata* Nees, Bonplandia 3: 83. 1855. *G. mexicana* Fourn. Mex. Pl. 2: 48. 1886. *G. grisebachiana* Fourn. Mex. Pl. 2: 48. 1886. *Pennisetum mexicanum* Hemsl. ex Jacks. Ind. Kew. 2: 458. 1894.

Pine and pine-oak forests, damp thickets, wooded or brushy slopes, dry hills and open places, 1,000–2,500 meters; Alta Verapaz; Izabal; Jalapa; Guatemala; Sacatepéquez; Chimaltenango; Quiché; Suchitepéquez; Quezaltenango. Common. Southern Mexico (Veracruz) to Panama.

Coarse, somewhat woody perennial; culms erect or ascending from strong rhizomes, sometimes geniculate at the lower nodes, simple, or sparingly branching, mostly 1–2 meters high, sometimes dwarf; sheaths usually as long as or longer than the internodes, loose, keeled toward the summit, glabrous, or the margins pilose above; ligule densely ciliate, about 2 mm. long; blades elongate, attenuate, 5–8 mm. or even 10 mm. wide, very scabrous; panicles 7–16 cm. long, nodding or flexuous, the spikelets pale, the bristles tawny or purple; fascicles ascending, containing 1 spikelet, the bristles usually numerous, slender, 12–15 mm. long, the innermost stouter, 15–25 mm. long; spikelets 6–7 mm. long, acuminate, minutely scabrous; first glume thin, 1-nerved, acute or obtuse, about one-third as long as the spikelet; second glume 5-nerved, three-fourths as long as the spikelet; sterile lemma 5-nerved, acuminate, a little shorter than the fruit, enclosing a palea and sometimes a staminate flower; fruit acuminate, the lemma scabrous above, the palea pubescent, the tip not enclosed.

Pennisetum distachyum (Fourn.) Rupr. Bull. Acad. Sci. Brux. 9(2): 242. 1842, nomen nudum; Chase, Contr. U. S. Nat. Herb. 22: 229. 1921. *Gymnothrix distachya* Fourn. Mex. Pl. 2: 48. 1886.

Moist thickets and pastures, 1,000–1,500 meters; Alta Verapaz. Southern Mexico; Costa Rica.

Robust perennial very similar in habit to *P. bambusiforme*; bristles scant, inconspicuous, mostly shorter than the spikelet, the innermost about twice as long as the spikelet; spikelets crowded, 4.5–5.5 mm. long; sterile palea wanting.

Pennisetum nervosum (Nees) Trin. Mém. Acad. St. Pétersb. VI. Sci. Nat. 1: 177. 1834. *Gymnothrix nervosa* Nees, Agrost. Bras. 277. 1829.

Little Cocquericot, Belize River, El Cayo District, British Honduras, *Lundell* 3867. Mexico (San Luiz Potosí, Veracruz); Ecuador and Brazil to Argentina.

Perennial; culms coarse, decumbent at the base, rather hard and woody, commonly 1–3 meters long; sheaths loose, glabrous, usually much shorter than the internodes; blades elongate, 8–15 mm. wide, scabrous; panicles 12–20 cm. long, 12–15 mm. wide, dense, flexuous at maturity, the numerous closely arranged fascicles ascending to finally reflexed, the slender scabrous bristles as much as 15 mm. long; spikelets solitary, sessile, 6–7 mm. long; sterile lemma empty; fruit subindurate, attenuate, minutely roughened.

Pennisetum purpureum Schumach. Beskr. Guin. Pl. 64. 1827. *Napier grass*.

Probably cultivated for forage, sometimes escaped; Jalapa; Escuintla. Introduced from Africa.

Perennial; culms erect, robust, branching, 2–4 meters high; blades elongate, 2–4 cm. wide, or smaller on the branches, scabrous; panicles 10–25 cm. long, dense, tawny, the axis densely pilose; fascicles numerous, sessile, finally spreading,



FIG. 80. *Pennisetum setosum*. Plant, $\times \frac{1}{2}$; two views of spikelet, and fertile floret, $\times 10$.

bearing 2 or 3 spikelets, the slender bristles sparsely plumose, unequal, exceeding the spikelets, the longer ones as much as 2 cm. long.

Pennisetum setosum (Swartz) L. Rich. in Pers. Syn. Pl. 1: 72. 1805. *Cenchrus setosus* Swartz, Prodr. Veg. Ind. Occ. 26. 1788. *Pennisetum purpurascens* H.B.K. Nov. Gen. & Sp. 1: 113. 1815. *P. nicaraguense* Fourn. Bull. Soc. Bot. France II. 27: 293. 1880. Figure 80.

Pine forests, along streams and lake shores, and marshy prairies, up to about 1,600 meters; Alta Verapaz; Izabal; Zacapa; Jalapa; Jutiapa; Guatemala. Southern Florida; West Indies; southern Mexico to Bolivia and Brazil.

Coarse perennial in large loose clumps; culms erect or ascending, sometimes geniculate at the lower nodes, bearing 1 to several branches from the lower and middle nodes, glabrous; sheaths much shorter than the internodes, usually glabrous or occasionally papillose-hirsute, sometimes ciliate on the margins near the summit; blades 10–40 cm. long, 4–18 mm. wide, long-acuminate, scabrous to densely papillose-hirsute, papillose-hispid on the margins near the base; panicles 10–25 cm. long, dense, usually somewhat nodding, pale yellow to purple or brown, the axis slender, obscurely scabrous; fascicles ascending to reflexed at maturity, containing 1 spikelet; bristles appressed to the spikelet, unequal, the outer ones slender, shorter than the spikelet, the inner ones stouter, as much as 12 mm. long, densely plumose below, scabrous above; spikelets 3.2–4 mm. long, sessile; first glume minute or obsolete; second glume longer than the sterile lemma, acuminate or obscurely lobed; sterile lemma truncate at the apex, the palea well developed and sometimes containing a staminate flower; fruit indurate, 2–3 mm. long, smooth and shining, the lemma and palea ciliate at the apex.

Pennisetum vulcanicum Chase, Jour. Washington Acad. Sci. 13: 363. 1923. *Torsón* (Zacapa); *Gusanillo* (Jutiapa).

Damp thickets and rocky slopes, up to 1,200 meters; Jutiapa; Zacapa. El Salvador; Costa Rica.

Perennial; culms erect, 1–1.5 meters high, sparingly branching, somewhat compressed, glabrous; sheaths keeled, papillose-pilose or nearly glabrous, usually much longer than the internodes; blades 20–45 cm. long, 5–8 mm. wide, attenuate, papillose-pilose on the upper surface; panicles 10–17 cm. long, dense, interrupted toward the base, the fascicles finally spreading or reflexed; bristles numerous, the outer ones slender, scabrous, the inner ones flattened, plumose, 1–1.5 cm. long, the innermost much stouter, 2–5 cm. long; spikelets 3–5 in each fascicle, only one or two well developed; spikelets 6–9 mm. long, scabrous; sterile lemma enclosing a well-developed palea and staminate flower; fertile lemma subindurate, attenuate.

PENTARRHAPHIS H.B.K.

Spikes densely hairy, composed of two perfect 2-flowered spikelets, the lower one sometimes reduced to two slender bristles, the rachis bifid, prolonged beyond

the spikelets as two hairy bristles; glumes villous, the first bristle-like, the second lanceolate, awned; lemmas deeply 3-lobed, the lobes awned; palea about as long as the lemma, bifid, the teeth aristate.

Slender, densely tufted perennial grasses with mostly basal leaves and few to several short, obovate, spreading spikes, evenly arranged, alternate on opposite sides of a flattened rachis, falling entire.

Species 2, in Mexico and Central America, one of them also in Colombia.



FIG. 81. *Pentarrhaphis scabra*, $\times \frac{1}{2}$.

Pentarrhaphis scabra H.B.K. Nov. Gen. & Sp. 1: 178. *pl.* 60. 1816. *Polyschistis paupercula* Presl, Rel. Haenk. 1: 294. *pl.* 41, *f.* 12. 1830. *Pentarrhaphis paupercula* Hack. & Scribn. Bull. Torrey Club 17: 233. 1890. Figure 81.

Shallow soil on rock outcrops, to about 1,500 meters; Petén; Santa Rosa; Quiché; Huehuetenango. Southern Mexico; Honduras; Colombia.

Culms erect, or sometimes geniculate at the lower nodes, 10–30 cm. high, glabrous, the upper internodes elongate; sheaths rounded, glabrous, sometimes sparsely villous at the throat; ligule very short, minutely erose; blades flat or loosely involute, 3–5 cm. long, those of the culm about 1 cm. long, not more than 1 mm. wide, glabrous or scaberulous; spikes mostly 8–12, 6–8 mm. long, usually ascending, composed of one fertile spikelet and a group of five bristles, two of these being the bifid prolongation of the rachis, two a rudimentary spikelet, and one the first glume of the fertile spikelet; second glume of the fertile spikelet 3 mm. long, the scabrous awn from between the teeth, about 2 mm. long; lemma about 4 mm. long, deeply 3-lobed, sparsely hairy, the awns stout, scabrous, 3 mm. long; palea equaling the lemma, the teeth aristate.

PEREILEMA Presl

Spikelets 1-flowered, in dense fascicles along the axis of a panicle, surrounded by numerous sterile spikelets in the form of bristles; rachilla disarticulating above the glumes, not produced beyond the floret; glumes equal, 1-nerved, thin, minutely lobed, awned from between the lobes, the awn slender, straight; lemma terete, pilose below, minutely bifid, the midnerve extending into a slender, flexuous, thread-like awn longer than the bristles; palea as long as the lemma, the keels approximate.

Annuals with narrow flat blades and dense interrupted panicles of small, awned spikelets.

Species 3, Mexico, Central America, and northern South America.

Lemma 1.5 mm. long. *P. crinitum*.

Lemma 2–3 mm. long. *P. beyrichianum*.

Pereilema beyrichianum (Kunth) Hitchc. Contr. U. S. Nat. Herb. 24: 385. 1927. *Muhlenbergia beyrichiana* Kunth, Enum. Pl. 1: 200. 1833. *Pereilema brasilianum* Trin. Mém. Acad. St. Pétersb. VI. Sci. Nat. 4: 136. 1841; 382. 1845.

Damp shaded bank, lower slopes of Volcán de Tecuamburro, Santa Rosa, Standley 78575. Costa Rica; Venezuela; Ecuador; Brazil.

Resembling *P. crinitum*; panicles less dense, interrupted, the lower branches distant, spreading to reflexed, 1–2 cm. long; lemma 2–3 mm. long.

Pereilema crinitum Presl, Rel. Haenk. 1: 233. *pl.* 37, *f.* a. 1830.
Figure 82.

Meadows, pine-oak forests, and brushy slopes, 1,250–1,900 meters; Alta Verapaz; Chiquimula; Jalapa; Jutiapa; Santa Rosa; Guatemala; Chimaltenango. Mexico to Ecuador.

Annual; culms 10–40 cm. high, erect or decumbent at the base, branching, especially at the lower nodes; sheaths much longer than the internodes, scabrous, auriculate, the auricles pubescent; ligule very short, truncate; blades 5–20 cm.



FIG. 82. *Pereilema crinitum*, $\times \frac{1}{2}$.

long, 2-4 mm. wide, gradually tapering to a usually long, petiole-like base, scabrous; panicles 3-12 cm. rarely 15 cm. long, narrow, dense, interrupted, the short branches usually appressed; lemma 1.5 mm. long, scabrous, the very fine flexuous awn 1-2 cm. long.

PHARUS L.

Spikelets unisexual, 1-flowered, in pairs, one pistillate, sessile, the other staminate, long-pedicellate, appressed along the panicle branches; staminate spikelets small; glumes unequal, the first shorter, 1-nerved, the second about as long as the floret, 3-nerved; lemma acute or subacute; stamens 6; pistillate spikelet large, terete; glumes short and acuminate to nearly as long as the floret, 3-several-nerved; lemma becoming indurate with a minute beak, straight or curved, partly to almost completely covered on the back with uncinat hairs, the margins inrolled, tightly enclosing the palea; stigmas 3.

Erect or decumbent perennials with broad, thin, petiolate, obliquely nerved, transversely veined blades and open panicles, the pairs of spikelets appressed along the branches; main axis short or elongate, terminating in a long slender bristle, the branch from the base of this bristle continuing the panicle and making it appear unsymmetrical, this branch articulate at the base and readily deciduous.

Species 8, tropical America.

Fruit pubescent only near the tip, slender, 15 mm. long, curved near the summit.

P. latifolius.

Fruit pubescent nearly to the base, plump, straight.

Glumes of pistillate spikelet green, more than half as long as the fruit.

P. virescens.

Glumes of pistillate spikelet reddish brown, not more than half as long as the fruit.

Culms erect; blades 3.5-4 cm. wide; staminate spikelets 3-4 mm. long.

P. glaber.

Culms decumbent, rooting at the lower nodes; blades 1.5-3 cm. wide; staminate spikelets 2 mm. long. *P. parvifolius.*

Pharus glaber H.B.K. Nov. Gen. & Sp. 1: 196. 1816.

This species is credited to Guatemala by A. S. Hitchcock (Contr. U. S. Nat. Herb. 24: 617. 1930), but the record is probably based on a misidentification. Southern Mexico; El Salvador; Costa Rica; Panama; West Indies; Colombia to Bolivia, Brazil, and northern Argentina.

Perennial; culms erect, 50-75 cm. high, glabrous; sheaths glabrous, smooth and shining; blades broadly lanceolate, mostly 15-18 cm. long, 3.5-4 cm. wide, gradually tapering toward both ends, acute, glabrous, shining; panicles 15-30 cm. long, the branches distant, stiffly ascending; staminate spikelets 3-4 mm. long, glabrous; glumes obtuse, the first one-third, the second about two-thirds as long as the floret; pistillate spikelets 9-12 mm. long; glumes equal, about half as long



FIG. 83. *Pharus latifolius*, $\times \frac{1}{2}$.

as the fruit, brown, glabrous; fruit plump, straight, densely pubescent to the base, the pointed glabrous tip about 1 mm. long.

Pharus latifolius L. Syst. Nat. ed. 10. 2: 1269. 1759. Figure 83.

Moist forests at low altitudes; Alta Verapaz. British Honduras; West Indies; southern Mexico to Peru and Brazil.

Erect perennial; culms 40–80 cm. high, glabrous; sheaths glabrous, keeled, all longer than the internodes, the lower ones elongate; blades oblanceolate, 10–30 cm. long, mostly 3.5–8.5 cm. wide, narrowed to a petiolate base, the petiole sometimes as much as 10 cm. long, the tip abruptly acuminate; panicles 10–30 cm. long, the branches stiffly ascending or spreading, rarely reflexed, sometimes reduced to a single branch; staminate spikelet 4 mm. long, glabrous or minutely scabrous; glumes obtuse, the first about 1 mm. long, the second 2.5–3.5 mm. long; pistillate spikelets 15 mm. long, subsessile or short-pedicellate, appressed; glumes 5–12 mm. long, acute or subobtuse, the second a little longer than the first; fruit slender, slightly curved at the tip, densely pubescent near the summit for a short distance, otherwise glabrous.

Pharus parvifolius Nash, Bull. Torrey Club 35: 301. 1908. Figure 84.

Moist forests at low altitudes; Petén; Izabal. British Honduras; southern Mexico (Veracruz); Costa Rica; Honduras; Panama; West Indies; Ecuador; Peru; Paraguay; Brazil.

Perennial; culms decumbent at the base, rooting at the lower nodes, mostly 60–100 cm. long; sheaths much overlapping, keeled, glabrous; blades lanceolate, acuminate, glabrous, mostly 15–20 cm. long, 15–30 mm. wide; panicles mostly 15–20 cm. long, the pubescent branches and branchlets stiffly and abruptly ascending to spreading; staminate spikelets 2 mm. long; pistillate spikelets 11–14 mm. long; glumes subequal, acute, about half as long as the fruit; fruit plump, densely pubescent all over except near the base and on the short, pointed tip.

Pharus virescens Doell in Mart. Fl. Bras. 2 (2): 1, 21. 1871.

Moist or wet forests at low altitudes; Alta Verapaz (Cubilgüitz). Dominican Republic; Costa Rica; Panama; Colombia; Venezuela; Ecuador; Peru; Brazil. Rare.

Perennial; culms erect from a usually decumbent base, often rooting at the lower nodes, 50 cm. to more than 1 meter long; sheaths all overlapping, flattened but scarcely keeled, glabrous; blades oblanceolate, gradually narrowed to the base, somewhat abruptly narrowed toward the end to an acuminate apex, scaberulous, 12–35 cm. long, 3–6.5 cm. wide at the widest place; panicles 15–30 cm. long, the branches as much as 23 cm. long, relatively few-flowered; staminate spikelets 3–4 mm. long, the first glume subobtuse, one-third to one-half, the second acuminate, as long as the spikelet; fertile spikelet 12–15 mm. long, the glumes equal, 8–11 mm. long, lanceolate, 3–5-nerved, acute or subacute, green; fruit straight or slightly curved, pubescent across the back at the summit, extending down the sides nearly to the base, the lower part of the back and narrow margins glabrous.



FIG. 84. *Pharus parvifolius*, $\times \frac{1}{2}$.

PHRAGMITES Adans.

Spikelets several-flowered, the rachilla densely covered with long fine silky hairs, disarticulating above the glumes and at the base of each segment between the florets, the first floret staminate or neuter, the others perfect; glumes unequal, narrow, acute, the first 1-nerved, the second 3-nerved; lemmas narrow, long-acuminate, each one successively smaller, the summits of all of them thus about equal; palea of staminate or neuter floret one-fourth as long as the lemma, that of the first fertile floret one-half as long as the lemma.

Coarse, rhizomatous, stoloniferous, reed-like perennials with firm, flat blades and large, silky, plume-like panicles.

Species 2, one in Asia, the other in temperate regions around the world.

Phragmites communis Trin. Fund. Agrost. 134. 1820. *Arundo phragmites* L. Sp. Pl. 81. 1753. Figure 85.

Marshes, river banks, and lake shores; Petén; Izabal. British Honduras. Temperate regions around the world, extending into the tropics.

Coarse, rhizomatous, stoloniferous perennial, usually growing in large colonies; culms erect, reed-like, 2–5 meters high; sheaths glabrous, much longer than the internodes; blades as much as 50 cm. long, 1–2.5 cm. wide, flat, firm, attenuate-pointed, with very scabrous margins; panicles 25–50 cm. long, plume-like, drooping, the branches naked below, densely villous in the lower axils; spikelets 12–20 mm. long; glumes unequal, the first 4–5 mm. long, the second 6–8 mm. long; lemma 10–13 mm. long, narrowly acuminate; rachilla hairs more than half as long as the lemma.

PHYLLOSTACHYS Sieb. & Zucc.

Unarmed dumetose bamboos, growing in more or less open clumps; actively spreading by means of slender, indeterminate rhizomes; culms erect or suberect and arched, never climbing; culm internodes typically hollow, cylindrical or nearly so above budless nodes, more or less strongly sulcate on one side from one node to the next above the point of insertion of branches or branch buds; culm nodes all gemmiferous in small plants, typically budless and branchless in the lower half or so of culms from plants of mature stature, the branch- or bud-bearing nodes typically double, i. e., with a distinct ridge encircling the culm just above the more or less prominent sheath scar; culm sheaths promptly deciduous. Branches typically two at each node, the two more or less strongly unequal, with a third, usually very much smaller, sometimes developing between the larger two (atypically and rarely, in exceptional culms, the branches clearly ternate, with the middle one the strongest of the three, a condition most commonly encountered in *P. nigra* and its varieties); leaf blades with clearly tessellate venation.

Inflorescences open to more or less congested, sometimes capitate, lateral to leafy or leafless branches; spikelets 2–several-flowered, the uppermost one rudimentary, the palea strongly to very weakly 2-keeled and usually bicuspidate; lodicules 3; stamens 3, with filiform, free filaments; ovary oblong, the style thick-



FIG. 85. *Phragmites communis*. Plant, $\times \frac{1}{3}$; spikelet and floret, $\times 3$.

ened and indurate at the base, long, slender above, stigmas typically 3. Mature fruit a starchy, sulcate caryopsis.

About 40 species have been described, most of which are indigenous to central and southern China, with a few in areas immediately to the south. Most of the known species thrive best in a moist, warm-temperate climate. Six species are known to have been introduced in Guatemala.

FIELD KEY

Occasional culms producing short, inflated internodes (2-12 or so together) usually in the lower one-third or two-thirds of the culm, very often at or near the base of the culm. *P. aurea*.

All culms producing normal internodes.

Culm nodes (sheath scar) and base of culm sheaths conspicuously fringed with brown hairs; blade of culm sheath broadly triangular, decurrent at the base into large auricles. *P. nidularia*.

Culm nodes (sheath scar) and base of culm sheaths glabrous or soon glabrescent; blade of culm sheath narrow, not decurrent into the auricles where these are present.

Culm sheaths in mature plants with a long, falcate auricle on one or both sides, somewhat removed from the base of the sheath blade.

Culm sheaths smooth and waxy to the touch, entirely glabrous or rarely with a few scattered, soft bristles on the back. *P. bambusoides*.

Culm sheaths perceptibly scabrous to the touch, with fine, antrorse and retrorse points between the somewhat salient veins, especially near the margins. *P. viridi-glaucescens*.

Culms sheaths in mature plants without auricles.

Fresh culm sheaths with red margins, and leaf sheaths with red-fringed ligules; culm internodes somewhat elongate, obscurely and sparsely puberulent or setulose at first, the culm nodes only slightly inflated.

P. rubromarginata.

Fresh culm sheaths and leaf sheaths with olive-green margins and pale ligule fringe; culm internodes shorter, and entirely glabrous, the culm nodes rather strongly inflated. *P. nuda*.

Phyllostachys aurea A. & C. Riviere, Bull. Soc. Acclim. Ser. 3. 5: 716. f. 36. 1878.

A Chinese species of early introduction in the Western Hemisphere, now widely distributed, chiefly as a garden ornamental, in the warm temperate and subtropical regions of the world; frequently seen as a hedge plant in Guatemala City. The date and agency of the introduction of this bamboo into Guatemala are not known.

The plant is cultivated extensively in Japan for its culms which, in normal times, are exported in large quantities. The mature culms make excellent fishing poles. The young shoots are edible. Guatemala; Suchitepéquez; Alta Verapaz. China; Japan.

Culms erect, straight, commonly reaching a height of 7 meters, rarely 10 meters or more, with corresponding diameters of 2 to 3 cm., rarely more, the internodes glabrous (occasional culms develop short, more or less inflated internodes, 2-12 or so together, usually in the lower one-half or two-thirds of the culm, very often at or near the base of the culm), the nodes rather prominent, the sheath scar at first bordered by a fringe of minute hairs, these gradually falling off. Culm sheaths sparsely maculate with small, dark spots, striate with salient veins, fringed with a narrow border of minute white hairs along the lower edge, otherwise entirely glabrous; auricles and oral setae lacking; ligule very short, truncate, ciliate on the margin, longer and fimbriate on the margin in sheaths higher on the culm; sheath blade linear, very elongate and recurved in the upper sheaths, one-fourth to one-third as wide at the base as the apex of the sheath proper, obscurely scabrous on the inner surface, glabrous on the outer surface, serrulate on the margins. Leaf sheaths usually glabrous except the uppermost one on each twig, which is puberulent with small, retrorse, uncinate hairs; auricles usually lacking, sometimes well developed, ovate; oral setae usually lacking except when auricles are present, then few to several, up to 5 mm. long, radiating from the borders of the auricles; ligule 1-1.5 mm. long, hispidulous on the back, concave or truncate at the apex, ciliate on the slightly irregular margin; petiole usually hispidulous at the base on the upper surface, otherwise usually glabrous or nearly so throughout; leaf blade up to 12 cm. long and 18 mm. wide, usually much smaller, oblong-lanceolate, glabrous on the upper surface, often slightly pilose at the base, otherwise glabrous or nearly so on the lower surface, strongly serrate on one margin, weakly so on the other.

Phyllostachys bambusoides Sieb. & Zucc., Abh. Akad. Muench. 3(3): 746. *pl. 5, fig. 3.* 1843. Figure 86.

A Chinese species, early introduced in Japan and now fairly familiar in cultivation in warm temperate parts of the United States and Europe, commonly referred to as the Giant Timber Bamboo. Introduced into Guatemala through the agency of the United States Department of Agriculture and established at Dr. Pedro Cofiño's finca, El Pintado, near Antigua.

This bamboo is much cultivated in China and Japan for its culms, which run the gamut of usefulness from general construction to basketry and lashings, with an infinitude of applications between. The young culms are much used for papermaking in China, and they rank high among the hardy bamboos that have been tested in the Western Hemisphere for this purpose. The young shoots are much esteemed as a vegetable in the Orient. Sacatepéquez; Suchitepéquez. China; Japan (whence the type).

Culms erect or ascending, straight below, often broadly nodding above, commonly reaching a height of 20 meters and a diameter of 10 or 12 cm., considerably larger in favorable situations; internodes glabrous and entirely free from white powder from the first; nodes only slightly prominent, the sheath scar glabrous from the first. Culm sheaths prominently maculate with small to large dark spots, smooth and waxy to the touch, glabrous or sometimes (in large culms) with a few soft cilia scattered on the back; auricles lacking in small plants, but in mature plants well developed, narrow, falcate, spreading, delicate, bordered by well-developed scabrous oral setae; ligule 2-3 mm. long, hispidulous on the back, fimbriate on the convex margin; sheath blade lanceolate-linear, often somewhat crisped, ultimately more or less strongly reflexed, obscurely antrorse-scabrous on the inner surface, glabrous on the outside, serrulate on the margins. Leaf sheaths glabrous or glabrescent where exposed, more or less puberulent where covered by adjacent ones; auricles none to several, well developed, scabrous, bordered by slender, slightly scabrous oral setae up to 1 cm. in length; ligule up to 3 mm. long, puberulent at the base on the back, ciliolate on the irregularly denticulate convex margin; petiole puberulent at the base on the lower surface, otherwise glabrous; leaf blade up to 17 or 18 cm. long and 25 or 30 mm. wide, oblong-lanceolate, glabrous on the upper surface, subglabrous to scattered pilose, especially along the midrib toward the base on the lower surface, antrorse-spinulose on one margin and glabrous or nearly so on the other.

Phyllostachys nidularia Munro, Gard. Chron. n. ser. 6: 773-774. 1876. Includes notes by E. O. Fenzi.

A species of wide natural distribution and common in cultivation in China. Fenzi (op. cit.) records its introduction into Italy, in 1868, from Japan, by the Italian corvette, *Magenta*, on its scientific voyage around the world. However, since the species has not been reported from Japan, or elsewhere outside of China, it must be assumed that it was picked up in Hong Kong or somewhere on the China coast. The species was introduced into the Western Hemisphere more recently, directly from China, through the agency of the U. S. Department of Agriculture, from which plants were secured for introduction into Guatemala and established at Dr. Pedro Cofiño's finca, El Pintado, near Antigua, Sacatepéquez. It was later established at Chicolá, Suchitepéquez, for trial. The plant is valued principally for its edible shoots, which are among the earliest, but its culms, although sometimes rather flexuous, are very durable and are suitable for picket fences and other uses around the garden, while the tough, resilient branches make useful and durable brooms. It is a robust, rapidly spreading, not very exacting species. Sacatepéquez; Suchitepéquez. China.

Culms ascending and broadly arched, up to 4 or 5, even 6 meters in height and 2 to 4 cm. in diameter; internodes lightly to heavily farinose, especially just below the nodes, obscurely scabrous at first then glabrescent, often more or less



FIG. 86. *Phyllostachys bambusoides* S. & Z. A, flowering branch, $\times 1$; B, B1, bract from peduncle, $\times 1$, and $\times 3$; C, branch of inflorescence, with bracts spread to show spikelets, $\times 1.5$; D, spikelet, $\times 1$; E, E1, empty glumes, $\times 3$; F, F1, lemma, $\times 3$; G, G1, palea, $\times 3$; H, pistil, with lodicules, $\times 3$. From Nakai, *Flora Sylvatica Koreana*, Part xx, pl. xii. 1933.

prominently striate with salient ridges, often solid in the lower part of the culm; nodes very much inflated, the sheath scar marked by a prominent callus and densely fringed with dark brown hairs which may persist for one or two years. Culm sheaths irregularly striped with white and wine on a green background, fringed at the base with a dense band of shaggy brown retrorse hairs, and fimbriate on the margins, otherwise glabrous, the sheath blade broadly triangular, appressed to the culm, decurrent on each side at the base into a prominent, somewhat ventricose, usually wine-colored, more or less scabrous auricle bordered by rather delicate, scabrous oral setae; ligule well developed, strongly convex, fimbriate on the margin. Leaf sheath striate with salient veins, ciliate on the margins, the lower ones on each twig usually glabrous on the back, the upper ones usually puberulent to more or less prominently scabrous with coarse, appressed hairs; auricles usually lacking; oral setae usually present, several, straight, stiff, appressed, scabrous; ligule scarcely exerted; petiole usually hirsute on the lower surface, glabrous or hispidulous on the upper surface; leaf blades up to 12 cm. long and up to 15 mm. wide, usually shorter, few, usually 2 or 3 on each twig, rather stiff and spreading, oblong-lanceolate, glabrous on the upper surface, paler and hirsute at the base, elsewhere glabrous to more or less densely puberulent, on the lower surface, cartilaginous and serrate on both margins.

Phyllostachys nuda McClure, Jour. Washington Acad. Sci. 35: 288. fig. 2. 1945.

A Chinese species introduced into the United States through the agency of the U. S. Department of Agriculture, which supplied to the Instituto Agropecuario Nacional material for trial in Guatemala at Chocóla. Its precise origin in China and its position in the Chinese economy are unknown, but from experience derived from its culture and trial in the United States, its culms are known to be useful for temporary garden structures such as arbors, trellises, and fences, as well as for garden stakes, while the young shoots are very palatable as a vegetable. Sacatepéquez; Suchitepéquez. China.

Culms erect or ascending, nodding, up to 6 or 7 meters tall and 3 cm. in diameter; internodes entirely glabrous, more or less copiously farinose at first, especially immediately below the nodes, the surface perceptibly ribbed; nodes rather prominent, glabrous; culm sheaths striate with more or less prominently salient veins, usually more or less maculate with diffuse purplish splotches of variable size and intensity of color, often copiously and loosely farinose at first, sometimes entirely smooth to the touch or, more commonly, perceptibly scabrous with antrorse prickles disposed in variable density between the veins, especially in the upper part of the back; auricles and oral setae not at all developed; ligule prominently exerted, scabrous on the back, truncate at the apex, ciliate on the somewhat irregular margin; sheath blade usually erect or strongly ascending, rarely more or less strongly reflexed in the lower sheaths, to linear, lanceolate and flat or nearly so in the upper ones, obscurely antrorse-scabrous on both surfaces and both margins. Leaf sheaths glabrous, or the uppermost sometimes setulose with retrorse hairs on the back; auricles and oral setae not developed; ligule in the lower sheaths rather prominently exerted, scarcely so in the upper ones, scabrous

on the back, convex at the apex, minutely ciliolate on the margin, fragile and fugacious; petiole glabrous on the lower surface, hispidulous basally on the upper surface; leaf blades up to 15 cm. long and 22 mm. wide, glabrous and shining on the upper surface, paler and antrorsely scabrous throughout and sparsely hirsute basally with pale, antrorse hairs on the lower surface, glabrous from base to tip on one margin, serrate on the other.

***Phyllostachys rubromarginata* McClure**, Lingnan Univ. Sci. Bul. 9: 44. 1940.

A subtropical Chinese bamboo of apparently limited local distribution in Kwangsi Province. It was introduced into the United States through the agency of the U. S. Department of Agriculture, which supplied plants now established on Dr. Pedro Cofiño's finca, El Pintado, near Antigua. From this source, plants were secured recently for trial at the field station of the Instituto Agropecuario Nacional, at Chocólá. The culms are suitable for garden needs such as stakes and picket fences, and the rather elongated, somewhat thin-walled internodes are good material for flutes and shepherds' pipes. The young shoots are edible. Sacatepéquez; Suchitepéquez. China, whence the type.

Culms erect or suberect, nodding, reaching a height of about 8 meters and a diameter of 27 mm. under average conditions; internodes rather elongated, glabrous or sometimes sparsely strewn with spreading setae at first in large culms, at length glabrescent, not at all farinose at first, but developing a white, farinose zone under the nodes in time; nodes only slightly inflated, the sheath scar glabrous or sometimes with an obscure fringe of microscopic hairs at first and soon glabrescent. Culm sheaths not maculate, but often more or less conspicuously streaked on the back and bordered on the upper margins with red (hence the specific name), the lowest ones sometimes retrorse-hirsute, the rest glabrous on the back and margins; auricles and oral setae lacking in all but the uppermost sheaths, which may have a few oral setae; ligule short, the apex slightly concave and often more or less asymmetrical, the margin pectinate with red bristles, these longer in the middle; sheath blade narrowly triangular to linear, erect in lower sheaths to reflexed in the upper ones, not at all crinkled. Leaf sheaths densely pilose, gradually glabrescent; auricles small and narrow, sometimes reflexed, the margin fringed with delicate, erect or radiate, scabrous, red oral setae; ligule short, truncate or slightly convex at the apex, pectinate with red bristles on the margin; petiole densely hirsute on both surfaces, the blades up to 13 cm. long and up to 24 mm. wide, oblong-lanceolate, with a subulate tip, hispid along the midrib and elsewhere sparsely pilose or glabrous on the upper surface, densely pilose at the base and hirsute along the midrib towards the base on the lower surface. The red color fades from the various structures as they become dry.

***Phyllostachys viridi-glaucescens* A. & C. Riv.**, Bull. Soc. Acclim. Ser. 3. 5: 700. fig. 28. 1878 (sensu lato).

A bamboo found wild and cultivated from north-central to southern China. This species was introduced into the United States through the agency of the U. S. Department of Agriculture, which supplied plants now established on Dr. Pedro Cofiño's finca, El Pintado, near Antigua. From this source, plants were secured recently for trial at the Chocotá field station of the Instituto Agropecuario Nacional. The culms are suited for garden needs; the young shoots are edible. The living plant is one of unusual decorative effect as an ornamental. Sacatepéquez; Suchitepéquez. China.

Culms erect or suberect, only slightly flexuose, broadly nodding, up to 5 or 6 meters in height and 3 cm. in diameter; internodes glabrous from the first and somewhat farinose (more thickly so just below the nodes), the surface smooth or striate with narrow, close-set ridges; nodes moderately prominent, the ridge narrow, the sheath scar glabrous. Culm sheaths striate with fine, close-set, salient veins, rather copiously farinose at first, pale green, maculate with brownish lavender in large culms, usually scabrous to the touch, with minute antrorse and retrorse prickles between the veins principally near the margins, sometimes villous on the back in large culms, minutely ciliolate on the margins; auricles lacking in small plants, sometimes one only on mid-culm sheaths in plants of medium stature, usually two on higher sheaths, slender, flagelliform or falcate; oral setae 0-few in the absence of auricles (occurring on one border only of the auricles when the latter are present), slender, scabrous; ligule short, weakly scabrous on the back, truncate or lightly concave at the apex, sparsely fimbriate on the margin with scabrous bristles; sheath blade persistent, more or less reflexed, flat in the lower sheaths, commonly more or less crinkled in the upper ones, linear to linear-lanceolate, about one-half to one-third as wide as the apex of the sheath, weakly scabrous on the inner surface, glabrous on the outer surface, scabrous on the margins. Leaf sheaths commonly tinted with wine, mostly pilose, the vestiture weaker and deciduous in the lower sheaths on each twig, denser and more persistent on the upper ones; auricles strongly developed, oblong, more or less falcate, bordered on the margins by numerous, well-developed, scabrous oral setae; ligule short, weakly scabrous on the back, broadly convex and somewhat undulate at the apex, minutely ciliolate on the margin; petiole in young culms puberulent or hirsute on both surfaces, in older culms often glabrescent on the upper surface; leaf blades varying widely in size and shape, up to 18 cm. long and up to 18 mm. wide, ovate-lanceolate to oblong-lanceolate to linear-lanceolate, glabrous and glossy on the upper surface, densely pilose throughout on the lower surface, strongly serrate on one margin, more weakly so on the other.

PIPTOCHAETIUM Presl

Spikelets 1-flowered, the rachilla disarticulating above the glumes; glumes equal, broad, abruptly acuminate; fruit obovate, coriaceous, shorter than the glumes, appressed-pubescent (in our species), the callus short, acute, usually bearded, the awn deciduous or persistent, flexuous or weakly geniculate; palea



FIG. 87. *Piptochaetium fimbriatum*. Plant, $\times \frac{1}{2}$; glume, floret, and palea, $\times 5$.

narrow, sulcate, the nerves approximate, the apex projecting above the summit of the lemma as a minute point.

Tufted perennials with narrow or involute blades and small open panicles.

Species about 25, mostly in temperate South America.

Piptochaetium fimbriatum (H.B.K.) Hitchc. Jour. Washington Acad. Sci. 23: 453. 1933. *Stipa fimbriata* H.B.K. Nov. Gen. & Sp. 1: 126. 1815. *Oryzopsis fimbriata* Hemsl. Biol. Centr. Amer. Bot. 3: 538. 1885. *O. seleri* Pilger, Verh. Bot. Ver. Brand. 51: 192. 1909. Figure 87.

Wet meadows and open places, 2,500–3,700 meters; Huehuetenango. Western Texas to Colorado and Arizona; Mexico.

Perennial; culms densely tufted, erect, 25–90 cm. high; leaves mostly crowded toward the base, the blades involute, filiform, flexuous, glabrous; panicles long-exserted, 5–15 cm. long, the slender branches usually in pairs, ascending to spreading, bearing a few long-pedicellate spikelets above the middle; spikelets about 5 mm. long, the glumes abruptly acuminate, 7-nerved, pale or purple; fruit a little shorter than the glumes, dark brown at maturity, appressed-pubescent, the awn 1–2 cm. long, obscurely twice-geniculate.

POA L.

Spikelets 2–several-flowered, the rachilla disarticulating above the glumes and between the florets, the uppermost floret reduced or rudimentary; glumes acute, the first 1-nerved, the second usually 3-nerved; lemmas acute or subobtuse, 5-nerved, glabrous or pubescent on the nerves, sometimes webbed at the base, the tip and margins often scarious.

Annuals or perennials with flat or folded blades, boat-shaped at the tip, and open or contracted panicles.

Species about 250, in cool and temperate regions of both hemispheres and in the tropics at higher altitudes.

Plants annual; lemmas densely pubescent on the nerves. *P. annua*.

Plants perennial; lemmas glabrous, or pubescent on the internerves below.

Cobweb present; lemmas pubescent on the nerves and internerves. . . *P. venosa*.

Cobweb wanting; lemmas glabrous.

First lemma 4 mm. long, acute; ligule not more than 1 mm. long. . . *P. tacanae*.

First lemma 3 mm. long, acute or subobtuse; ligule about 3 mm. long.

P. seleri.

Poa annua L. Sp. Pl. 68. 1753. *Aira pumila* Pursh, Fl. Amer. Sept. 1: 76. 1814. *Poa infirma* H.B.K. Nov. Gen. & Sp. 1: 158. 1816. *P. aestivalis* Presl, Rel. Haenk. 1: 272. 1830. *Eragrostis infirma* Steud. Nom. Bot. ed. 2. 1: 563. 1840.

Moist places, usually a weed in gardens, 1,300–4,400 meters; Alta Verapaz; Izabal; Guatemala; Sacatepéquez; Quezaltenango; Huehuetenango; San Marcos. Cool or temperate regions of both hemispheres. Introduced in America.

Soft, erect or decumbent-spreading annual; culms flattened, commonly 5–20 cm. high, glabrous; sheaths thin with hyaline margins, mostly longer than the internodes; ligule hyaline, about 5 mm. long; blades flat, mostly 5–10 cm. long, 1–3 mm. wide, the margins scabrous; panicle 3–10 cm. long, open, with rather short ascending to spreading branches; spikelets short-pedicel, crowded, 3–6-flowered; first glume 1.5–2 mm. the second 2–2.5 mm. long; lemmas about 3 mm. long, subobtusate, distinctly nerved, densely pubescent on the nerves, not webbed at the base.

Poa seleri Pilger, Verh. Bot. Ver. Brand. 51: 195. 1909. *P. guatemalensis* Hitchc. Proc. Biol. Soc. Washington 40: 81. 1927.

In shade, Volcán de Agua, 2,000–3,500 meters; Sacatepéquez, the type of *Poa guatemalensis* Hitchc., *Hitchcock* 9115; in woods between Totonicapán and Los Encuentros, Sololá, the type of *Poa seleri* Pilger, *Seler* 2360.

Perennial, apparently with rhizomes; culms erect, decumbent at the base, 40–50 cm. high; sheaths scaberrulous, shorter than the internodes; ligule 2–3 mm. long; blades lax, flat, 8–20 cm. long, 1–2 mm. wide, glabrous or somewhat scabrous above; panicle 8–11 cm. long, the branches flexuous, solitary or in pairs, bearing a few spikelets above the middle; spikelets 4–5 mm. long, 2-flowered or occasionally 3-flowered, the rachilla glabrous; first glume 1.5 mm. long, narrow, acute, the second broader, about 2 mm. long; lemmas glabrous, acute or subobtusate, the lowest 3 mm. long.

Poa tacanae Swallen, Contr. U. S. Nat. Herb. 29: 399. 1950.

Rocky summits, pine and pine-alder forests, and open slopes, 2,500–4,600 meters; Quezaltenango; San Marcos, the type from Volcán Tacaná, *Steyermark* 36083.

Perennial with creeping rhizomes; culms erect or decumbent-spreading, 25–60 cm. high; sheaths all longer than the internodes, smooth and shining; ligule truncate, not more than 1 mm. long; blades flat, lax, mostly 10–15 cm. long, 1–2 mm. wide, scabrous toward the tip, especially on the under side of the midnerve and on the margins; panicle about 9 cm. long, the slender nearly glabrous branches flexuous, few-flowered, naked below; spikelets 2–3-flowered; glumes narrow, acuminate or subacuminate, lunate, the first 1.8–2 mm. long, the second 2.5 mm. long; first lemma 4 mm. long, gradually narrowed from the base, acute, scabrous at least on the nerves at the tip, otherwise glabrous.

Poa venosa Swallen, Contr. U. S. Nat. Herb. 29: 399. 1950. Figure 88.

Alpine meadow, vicinity of Chémal, summit of Sierra de los Cuchumatanes, Huehuetenango, 3,700–3,750 meters. Known only from the type collection, *Steyermark* 50310.

Perennial; culms erect, 50–70 cm. high; sheaths mostly shorter than the internodes, glabrous; ligule 1 mm. long; blades 3–8 cm. long, 2–4 mm. wide, glabrous; panicle 10–13 cm. long, the scabrous branches usually in pairs, rather narrowly ascending or the lower ones spreading, more or less flexuous, naked below, the lowermost as much as 5 cm. long; spikelets 2–3-flowered, 4–5 mm. long, greenish-purple; glumes acute, the first 2–3 mm. long, 1-nerved, the second a little broader, 2.5–3 mm. long, 3-nerved; first lemma 3.5 mm. long, acute, densely pubescent on the lower half, with a prominent cobweb at the base.

POLYPOGON Desf.

Spikelets 1-flowered, disarticulating below the glumes; glumes equal, similar, awned from the tip or from between minute lobes, the awns slender, straight; rachilla not produced beyond the florets; lemma much shorter than the glumes, hyaline, with a straight slender awn, shorter than the awns of the glumes; palea present.

Somewhat coarse, erect or decumbent perennial (in our species) grasses with flat blades and narrow, often elongate, dense panicles.

Species about 10, in temperate regions of both hemispheres.

Polypogon elongatus H.B.K. Nov. Gen. & Sp. 1: 134. 1815. Figure 89.

Moist pine slopes, marshes, and moist open ground, sometimes in gardens, mostly 1,500–3,000 meters; Zacapa; Jalapa; Guatemala; Sacatepéquez; Quezaltenango; San Marcos. Mexico to Argentina.

Rather coarse perennial; culms erect or usually decumbent-spreading at the base, as much as 1 meter long, glabrous; sheaths glabrous, shorter than the internodes; ligules thin, obtuse, 3–5 mm. long; blades 10–30 cm. long, 5–10 mm. wide, smooth and shining beneath, scabrous above and on the margins; panicles 10–35 cm. long, nodding, narrow and rather dense, interrupted, the branches in rather distant verticils, floriferous to the base; glumes about 3 mm. long, aristate, gradually narrowed into the awn, very scabrous; lemma 1.5 mm. long, with a slender awn about 2 mm. long.

PSEUDECHINOLAENA Stapf

Spikelets solitary, sometimes an abortive spikelet below it, pedicellate, rather distant, in two rows on one side of a slender raceme; first glume nearly as long as the spikelet, acute or mucronate, 3–5-nerved; second glume a little longer than the first, acuminate, saccate, 5-nerved, usually covered with stiff hooked bristles; sterile lemma about as long as the second glume, somewhat indurate, broad, obtuse, with thin margins, glabrous; fruit narrow, subacuminate, smooth and shining, the margins rather broad, not inrolled.



FIG. 88. *Poa venosa*. Inflorescence, $\times 1\frac{1}{2}$; spikelet, $\times 8$.



FIG. 89. *Polypogon elongatus*. Inflorescence, $\times 1$; spikelets, $\times 12$.

Slender decumbent-spreading annuals with short, broad, flat blades, and short slender racemes distant on the common axis. Monotypic.

Pseudechinolaena polystachya (H.B.K.) Stapf in Prain, Fl. Trop. Afr. 9: 495. 1919. *Echinolaena polystachya* H.B.K. Nov. Gen. & Sp. 1: 119. 1815. *Panicum uncinatum* Raddi, Agrost. Bras. 41. 1823. Figure 90.

Moist brushy slopes and banks, forests, sometimes a weed in cultivated groves, up to 1,800 meters; Alta Verapaz; Izabal; Chiquimula; Escuintla; Suchitepéquez; Retalhuleu; Quezaltenango; San Marcos. Mexico to Bolivia, Brazil, and Paraguay; tropical Africa.

Delicate decumbent-spreading annual; culms 15 cm. to as much as 1 meter long, branching, rooting at the lower nodes, more or less pilose; sheaths mostly much shorter than the internodes, rather densely papillose-pilose or hirsute, especially toward the summit; ligule brown, about 1 mm. long; blades ovate-lanceolate, often unsymmetrical, 2-7 cm. long, 5-16 mm. wide, thin, acuminate-pointed, appressed-pilose on both surfaces; inflorescence 5-20 cm. long, the axis pilose, the slender distant racemes usually narrowly ascending; spikelets 3-4 mm. long, appressed or somewhat spreading, the pedicels 1-3 mm. long; first glume broad, acute, pubescent, a little shorter than the spikelet; second glume longer than the first, sparsely to densely covered with coarse glandular-tipped hairs; fruit about 2 mm. long, acute, smooth and shining.

RHYNCHELYTRUM Nees

First glume minute; second glume and sterile lemma equal, raised on a stipe above the first glume, gibbous, the apex spreading, short-awned, both covered with long silky hairs; sterile lemma enclosing a well-developed palea and often a staminate flower; fertile lemma shorter than the spikelet, obtuse, smooth, the margins thin, not inrolled, enclosing the margins of the palea.

Perennials or annuals with rather open panicles of silky, short-pedicellate spikelets.

Species about 35, mostly in Africa.

Rhynchelytrum roseum (Nees) Stapf & Hubb. ex Bews, World Grasses 223. 1929, in Prain, Fl. Trop. Afr. 9: 880. 1930. *Tricholaena rosea* Nees, Fl. Afr. Austr. 17. 1841. *Panicum roseum* Steud. Syn. Pl. Glum. 1: 92. 1854. Figure 91.

Roadsides, fields, and brushy slopes, up to 1,600 meters; Petén; Alta Verapaz; Escuintla; Guatemala; Sacatepéquez; Quezaltenango. Florida, Mexico, and the West Indies, to Bolivia, Paraguay, and Brazil. Introduced from Africa.

Perennial; culms rather slender, erect or decumbent at the base, branching, 0.5-1 meter high; sheaths sparsely papillose-hirsute; blades flat, 5-15 cm. long,



FIG. 90. *Pseudechinolaena polystachya*, about $\times \frac{1}{2}$.



FIG. 91. *Rhynchelytrum roseum*. Plant, $\times \frac{1}{2}$; spikelet and floret, $\times 10$.

2-5 mm. wide, the margins scabrous; panicles 10-15 cm. long, rosy purple, the slender branches ascending to almost spreading, rather densely flowered; spikelets 5-7 mm. long, including the hairs, the pedicels short, capillary, flexuous or recurved; fruit about 2 mm. long.

SACCHARUM L.

Spikelets all alike, in pairs, one sessile, the other pediceled, surrounded at the base with long silky hairs, the rachis readily disarticulating below the spikelets; glumes firm, 1-3-nerved, acute or acuminate; sterile lemma similar to the glumes but hyaline, the fertile lemma shorter than the glumes, hyaline, awnless, sometimes wanting.

Tall, coarse perennial grasses with large plume-like inflorescences of paniced racemes.

Species about 10, mostly in the tropics of the Eastern Hemisphere.

Saccharum officinarum L. Sp. Pl. 54. 1753. *Caña de Azucar*; *sugarcane*. Figure 92.

No specimens have been collected in Guatemala as naturalized or away from cultivation, but the plant is extensively cultivated, as it is in tropical regions around the world.

Perennial; culms erect or ascending, as much as 4 meters high, glabrous, the lower internodes short; sheaths overlapping, rounded, glabrous, or softly pubescent toward the summit, densely villous in the throat, the lower ones readily falling away from the culm; ligule firm, dark brown, truncate, minutely ciliate, about 5 mm. long; blades elongate, broad, with prominent midnerve, sharply serrate, densely pubescent or villous on the upper surface at the base; panicles very large, dense, plummy, silvery or pinkish, the long branches drooping; spikelets 4-5 mm. long.

SACCIOLEPIS Nash

Spikelets oblong-conic; first glume acute, 3-5-nerved, small to half as long as the spikelet; second glume broad, inflated-saccate, strongly many-nerved; sterile lemma narrower, flat, usually 5-nerved, the palea well developed and often enclosing a staminate flower; fruit much smaller than the spikelet, very short-stipitate, chartaceous-indurate, the margins inrolled, the palea free at the summit.

Erect or decumbent-spreading annual with linear blades and dense elongate spike-like panicles.

Species about 30, in the tropics of both hemispheres.

Sacciolepis myuros (Lam.) Chase, Proc. Biol. Soc. Washington 21: 7. 1908. *Panicum myuros* Lam. Tabl. Encycl. 1: 172. 1791. *P. myosurus* L. Rich. Act. Soc. Hist. Nat. Paris 1: 106. 1792. *Hy-menachne myuros* Beauv. Ess. Agrost. 49: 165. 1812. *Panicum phleiforme* Presl, Rel. Haenk. 1: 302. 1830. Figure 93.



FIG. 92. *Saccharum officinarum*. Plant, much reduced; spikelet with pedicel and rachis joint, $\times 5$.

Open marshy prairie near Los Amates, Izabal. British Honduras; Cuba; southern Mexico; Honduras; Panama; Colombia to British Guiana and Brazil.



FIG. 93. *Sacciolepis myuros*. Inflorescence, $\times 2$; spikelet, $\times 23$.

Slender annual; culms usually erect, 10 cm. to as much as 1 meter high; sheaths glabrous, longer than the internodes; blades mostly 10–25 cm. long, 3–5 mm. wide, or smaller in depauperate specimens, glabrous or rarely sparsely hairy; panicles spikelike, 5–25 cm. long (commonly 10–15 cm.), about 5 mm. thick; spikelets 2 mm. long, sparsely pilose.

SCHIZOSTACHYUM Nees

Unarmed, caespitose or dumetose bamboos, growing in crowded or more or less open clumps, spreading by short, thick, determinate rhizomes (these provided

with a long neck, and thus more tardily determinate, in the dumetose species, such as *S. hainanensis*), the culms erect or suberect, with slender, nodding, trailing or clambering tips; culm internodes typically hollow, thin-walled, cylindrical or nearly so; commonly siliceous and rough to the touch on the surface; culm nodes usually not at all or scarcely inflated, all gemmiferous in small plants, typically budless and branchless in the lower half or more of culms from plants of mature stature; culm sheaths usually persistent, at least at the budless nodes, stiff, brittle, with a usually narrow, strongly reflexed sheath blade (broad and not at all reflexed in *S. brachycladum* and *S. zollingeri*); branches numerous, slender, subequal; leaf blades without typically tessellate venation but often with numerous transverse ridges visible on the lower surface. Inflorescences open or more or less congested and capitate clusters of pseudospikelets terminal or lateral on usually leafy branches; spikelets 2-3-flowered, the uppermost one always rudimentary and borne on a slender, elongated rachilla segment hidden in the tubular sulcus at the back of the palea of the uppermost perfect floret; lemma and palea more or less strongly and tightly involute in spikelets with one perfect floret and in the uppermost perfect floret where there are two (loosely convolute in the lower perfect floret where there are two), the palea sulcate but not strongly keeled, the sulcus tubular in the tightly involute spikelets, broad and not closed in the loosely involute spikelets; lodicules 0-3; stamens 6, the filaments flattened and sometimes more or less connate at the edges; ovary oblong, the style long, slender, indurate, persistent, tipped by usually 3 short, plumose stigmas. Mature fruit a dry, starchy caryopsis enclosed in a crustaceous, fusiform to subcylindrical, beaked pericarp.

Over 40 species have been described; the geographical range of the genus is confined to tropical or subtropical regions from southern China through southeastern and southern Asia and adjacent islands to Madagascar. One species has been introduced in Guatemala.

Schizostachyum pseudolima McClure, Lingnan Sci. Jour. 19: 537. pls. 39, 40. 1940. Figure 94.

A subtropical species cultivated in southern Kwangtung Province, and wild in Hainan Island, China. The whole culms, and matting woven from the flattened-out culms, are used for covering the walls of houses; thin withes split from the culms are used in basketry, while the long internodes are ideal for making flute-like musical instruments. The species was introduced into the Western Hemisphere at Lancetilla in 1925, and from that source material was supplied to the Instituto Agropecuario Nacional for trial at Chocóla. Suchitapéquez. China, whence the type.

Clumps dense; culms up to 10 meters long and 4 cm. in diameter, erect or suberect, with pendulous or scandent tips; internodes very long, thin-walled, the surface strongly siliceous, glabrous to appressed-aciculate and papillose; nodes not inflated, the sheath scar rather prominent. Culm sheaths tardily deciduous, siliceous, asperous, and more or less densely strewn with random-appressed white or transparent, sharp bristles, at length at least partially glabrescent; auricles

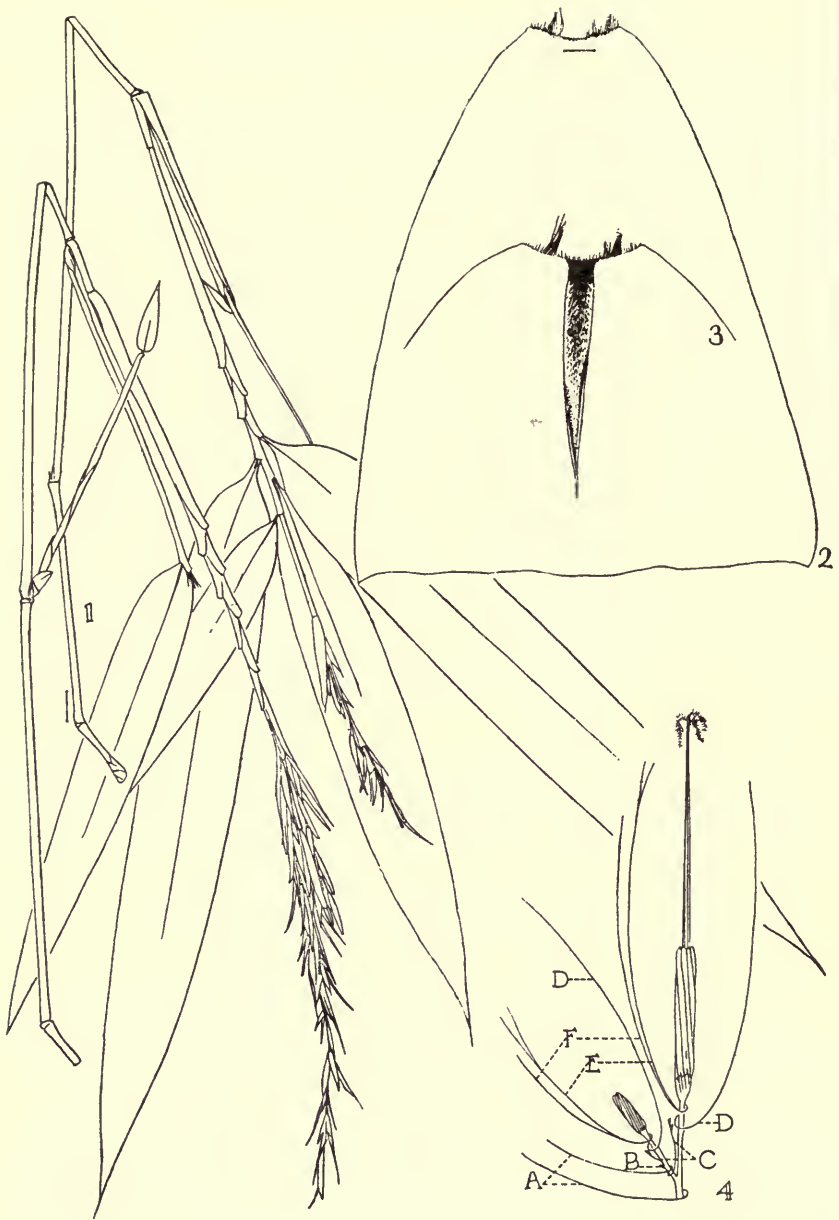


FIG. 94. *Schizostachyum pseudolima* McClure. 1, leafy branches bearing inflorescences distal to the leaves; $\times 0.4$. 2, culm sheath from about node 5, ventral aspect; $\times 0.3$. 3, the tip of a larger sheath from about the fifth node, dorsal aspect; $\times 0.5$. 4, diagrammatic representation of longitudinal section of terminal portion of branch of inflorescence: A, bracts; B, bud; C, prophylls; D, lemmas; E, palea; F, prolongation of rachilla. Lingnan Sci. Jour., 19: pl. 39. 1940. Based on the type. Drawn by McClure.

lacking; oral setae numerous, pale or dark, thick, rigid, smooth, fragile and fugacious; ligule very short, concave at the apex, densely fringed on the margin with pale, slender, fragile cilia; sheath blade strongly reflexed, linear-lanceolate, long-acuminate, involute and subulate above, about one-fourth or one-fifth as wide at the base as the apex of the culm sheath, antrorse-hispid on the upper surface, glabrous or subglabrous on the lower. Leaf sheaths often more or less striate with salient veins, usually glabrous, sometimes hispid and papillose; auricles usually lacking; oral setae now lacking entirely, now well developed, pale, rigid, smooth, fragile, usually fugacious; ligule very short, often not exerted, truncate, fringed on the margin with delicate, fugacious cilia; petiole elongate, glabrous on both surfaces; leaf blade to 25 cm. long and 32 mm. wide, oblong-lanceolate, subulate, with a smooth awn at the tip, scabrous along the midrib and along one edge and elsewhere glabrous or lightly asperous, and sometimes sparsely strewn with white bristles on the upper surface, pilose at first then glabrescent and minutely papillose between the nerves, on the lower surface, cartilaginous and serrulate on both margins, more often nearly glabrous on one; midrib and secondary veins salient on the lower surface, scarcely distinguishable from the tertiary veins on the upper surface, transverse ridges rarely discernible.

SETARIA Beauv.

Spikelets subtended by one or more bristles, the spikelets deciduous, the bristles persistent; first glume broad, less than half as long as the spikelet, 3-5-nerved; second glume and sterile lemma nearly equal, slightly longer than the fruit, or the glume sometimes shorter; fruit indurate, smooth or rugose.

Annuals or perennials with flat, sometimes plaited blades, and spikelike, bristly panicles, or the panicles open with the spikelets rather crowded along the branches, some of the branches or branchlets reduced to sterile bristles around the spikelets.

Species at least 100, in warm temperate and tropical regions of both hemispheres.

Blades plaited, narrowly elliptic; bristles usually below only some of the spikelets; panicles 40-70 cm. long, the lower branches distant, compound, ascending to spreading, as much as 25 cm. long. *S. paniculifera*.

Blades not plaited; bristles below all the spikelets.

Bristles retrorsely scabrous, at least toward the tip.

Plants perennial; culms erect, densely tufted. *S. tenax*.

Plants annual; culms usually decumbent-spreading, freely branching.

Spikelets 2 mm. long. *S. verticillata*.

Spikelets 1.5-1.7 mm. long.

Bristles retrorsely scabrous only at the tip, 3-6 mm. long, not implicate.

S. scandens.

Bristles retrorsely scabrous to the base, 5-10 mm. long, becoming implicate. *S. tenacissima*.

Bristles antrorsely scabrous only.

Plants perennial.

Panicles 2–10 cm. long, dense, spikelike, the axis pubescent and sparsely villous; bristles below each spikelet more than 5. *S. geniculata*.

Panicles 15–30 cm. long, as much as 6 cm. wide, rather loose, the axis densely villous; bristles below each spikelet 1 or 2; culms coarse, as much as 2 meters long. *S. vulpiseta*.

Plants annual.

Blades softly pubescent. *S. yucatanana*.

Blades scabrous.

Axis of panicle scabrous; spikelets 2 mm. long. *S. liebmanni*.

Axis of panicle densely covered with long ascending or appressed hairs.
S. longipila.

Setaria geniculata (Lam.) Beauv. Ess. Agrost. 51: 178. 1812. *Panicum geniculatum* Lam. Encycl. 4: 727. 1798. *Setaria gracilis* H.B.K. Nov. Gen. & Sp. 1: 109. 1815. *Panicum imberbe* Poir. in Lam. Encycl. Suppl. 4: 272. 1816. *P. flavum* Nees, Agrost. Bras. 238. 1819. *Chaetochloa imberbis* Scribn. U. S. Dept. Agr. Div. Agrost. Bull. 4: 39. 1897. *C. imberbis geniculata* Scribn. & Merr. U. S. Dept. Agr. Div. Agrost. Bull. 21: 12. 1900. *C. geniculata* Millsp. & Chase, Field Mus. Bot. 3: 37. 1903. For complete synonymy see Contr. U. S. Nat. Herb. 22 (3): 168–171. 1920.

Swamps, prairies, fields, and roadsides, common in cultivated ground and waste places, up to 1,500 meters; Petén; Alta Verapaz; Izabal; Jalapa; Santa Rosa; Escuintla; Guatemala; Sololá; Suchitopéquez; Retalhuleu; Quezaltenango. British Honduras; West Indies; southern United States to Argentina; also in the Old World.

Densely tufted perennial; culms erect or geniculate-spreading, from short knotty rhizomes, 20 cm. to more than 1 meter long, branching at the lower nodes, glabrous; sheaths keeled, glabrous or scabrous toward the summit; ligule 0.5–1 mm. long, densely minutely ciliate; blades mostly 5–15 cm. long, 4–6 mm. wide, flat, acuminate, scabrous, often sparsely villous on the upper surface toward the base; panicles dense, narrow, spikelike, yellow, purple, tawny, or greenish, mostly 2–6 cm. long, or as much as 10 cm. long on robust plants, the axis densely pubescent and sparsely villous; bristles below each spikelet 5 or more, commonly 5–10 mm. long, sometimes not longer than the spikelets; spikelets 2–2.5 mm. or even 3 mm. long, ovoid; first glume one-third as long as the spikelet, 3-nerved; second glume half to two-thirds as long as the spikelet, 5-nerved; sterile lemma acute, as long as the fruit, 5–7-nerved, the palea well developed, sometimes with a staminate flower; fruit strongly transversely rugose.

Setaria liebmanni Fourn. Mex. Pl. 2: 44. 1886. *Chaetochloa liebmanni* Scribn. & Merr. U. S. Dept. Agr. Div. Agrost. Bull. 21: 31. 1900.

Damp thickets, fields, and waste places at low altitudes; Chiquimula; Retalhuleu. United States (Arizona); Mexico; Honduras; Nicaragua.

Annual; culms usually less than 50 cm. tall, sometimes as much as 1 meter, erect or ascending, branching at the lower nodes, scabrous below the panicles, the nodes sometimes appressed-pilose; sheaths glabrous, densely ciliate, the collar appressed-pilose or hispid; blades as much as 20 cm. long, 2 cm. wide, acuminate, narrowed toward the base, lax, scabrous; panicles usually 5–20 cm. long, rarely longer, loosely flowered, the axis scabrous; bristles 7–15 mm. long, slender, scabrous, 1 or 2 below each spikelet; spikelets 2 mm. long, ovate; fruit pointed, gibbous, strongly transversely rugose.

Setaria longipila Fourn. Mex. Pl. 2: 47. 1886. *Chaetochloa longipila* Scribn. & Merr. U. S. Dept. Agr. Div. Agrost. Bull. 21: 22. 1900.

Moist woods and fields, Suchitepéquez (Mazatenango). Mexico; El Salvador; Honduras.

Annual; culms erect or decumbent at the base, 20–50 cm. high, sparingly branching, the nodes appressed-hispid; ligule a dense line of hairs about 2 mm. long; blades 4–10 cm. long, 5–11 mm. wide, thin, flat, scabrous, sparsely hispid, acuminate, narrowed toward the base; panicles 4–9 cm. long, the axis densely covered with ascending or appressed hairs about 2 mm. long; bristles mostly one below each spikelet, 3–8 mm. long; spikelets 1.7 mm. long, subglobose; fruit sharply transversely rugose, covered by the second glume and sterile lemma.

Setaria paniculifera (Steud.) Fourn. Mex. Pl. 2: 42. 1886. *Panicum sulcatum* Aubl. Pl. Guian. 1: 50. 1775. Not *P. sulcatum* Bertol., 1820. *P. paniculiferum* Steud. Syn. Pl. Glum. 1: 54. 1854. *Setaria effusa* Fourn. Mex. Pl. 2: 42. 1886. *Chaetochloa sulcata* Hitchc. Contr. U. S. Nat. Herb. 17: 260. 1913. *Setaria sulcata* A. Camus, Bull. Mus. Hist. Nat. 30: 108. 1924. Not *S. sulcata* Raddi, 1823. *Camelote* (San Marcos); *Maisillo* (British Honduras). Figure 95.

Pine forests, swamps, hillsides, and stream banks, sometimes in coffee plantations, sea level to 1,500 meters; Petén; Alta Verapaz; Izabal; Chiquimula; San Marcos. British Honduras (El Cayo District); West Indies; southern Mexico to Colombia.

Robust perennial; culms erect, 1.5–4 meters high; sheaths keeled toward the summit, papillose or papillose-hispid, especially along the margins and on the collar; blades conspicuously plicate, 0.5–1 meter long, 3–5 cm. or even 10 cm. wide, scabrous, acuminate, narrowed toward the base to the width of the sheath, sometimes petiole-like; panicles narrow or finally loose and open, 40–70 cm. long, the lower branches distant, compound, loosely to rather densely flowered, ascending to spreading, as much as 25 cm. long, the upper shorter, approximate, nearly simple; spikelets 3 mm. long, pointed, the bristles about 15 mm. long; first glume

obtuse, 3-5-nerved, about half as long as the spikelet; second glume acute, 5-7-nerved, two-thirds as long as the spikelet; fruit narrow, acute, finely transversely rugose.

Setaria scandens Schrad. ex Schult. Mant. 2: 279. 1824. *Panicum scandens* Trin. Gram. Pan. 166. 1826. *P. trinii* Kunth, Enum. Pl. 1: 151. 1833. *Chaetochloa scandens* Scribn. in Donn. Smith, Enum. Pl. Guat. 5: 91. 1899. *Gusanillo, soko-yah* (Huehuetenango).

Moist fields, up to 1,200 meters; Alta Verapaz; Huehuetenango. Southern Mexico; Honduras; Costa Rica; Panama; Colombia to Bolivia, Brazil, Paraguay, and Argentina (Misiones).

Freely branching annual; culms slender, erect or geniculate-spreading, glabrous, the nodes often appressed-pilose, 25-80 cm. high; sheaths compressed, keeled, glabrous to pilose, the margins papillose-ciliate; ligule densely ciliate, about 1 mm. long; blades 5-15 cm. long, 4-10 mm. wide, acuminate, tapering to a narrow base, scabrous and more or less pilose; panicles dense, spike-like, cylindrical, green or often purple, sometimes interrupted at the base, 3-8 cm. long, the axis scabrous or pubescent and also long-pilose, the branches very short; bristles at least partly retrorsely scabrous, especially at the tip, 3-6 mm. long, 1-3 below each spikelet; spikelets 1.5-1.7 mm. long, rather turgid; first glume about half as long as the spikelet, broad, acute or subobtuse, 3-nerved; second glume and sterile lemma nearly equal, 5-nerved, covering the fruit; fruit strongly plano-convex or subhemispheric, transversely rugose.

Setaria tenacissima Schrad. ex Schult. Mant. 2: 279. 1824. *Panicum tenacissimum* Nees, Agrost. Bras. 238. 1829. *Chaetochloa tenacissima* Hitchc. & Chase, Contr. U. S. Nat. Herb. 18: 352. 1917. Figure 96.

Thickets and ravines, up to 1,600 meters; Santa Rosa. British Honduras (El Cayo District); West Indies; Central America; Colombia and Venezuela; Peru, Bolivia, and Brazil.

Annual; culms simple to rather freely branching, erect or leaning or clambering over vegetation, 30 cm. to as much as 2 meters long, glabrous, sometimes scabrous below the panicle; sheaths compressed, keeled, more or less antrorsely scabrous or nearly glabrous, the margins sometimes ciliate toward the summit; ligule densely ciliate, about 0.5 mm. long; blades 6-20 cm. long, 4-10 mm. or sometimes 15 mm. wide, long-acuminate, firm, very scabrous, especially on the margins, and also pilose; panicles 5-15 cm. long, more or less flexuous, green or usually tinged with purple, the axis densely pubescent and sparsely pilose; bristles one below each spikelet, 5-10 mm. long, prominently retrorsely scabrous above, antrorsely below, flexuous, becoming implicate and tangled; spikelets 1.5 mm. long, usually purple; first glume half as long as the spikelet, 3-nerved; second glume and sterile lemma equal, 5-nerved, covering the finely transversely rugose fruit.

Setaria tenax (L. Rich.) Desv. Opusc. 78. 1831. *Panicum tenax* L. Rich. Act. Soc. Hist. Nat. Paris 1: 106. 1792. *P. impressum* Nees,

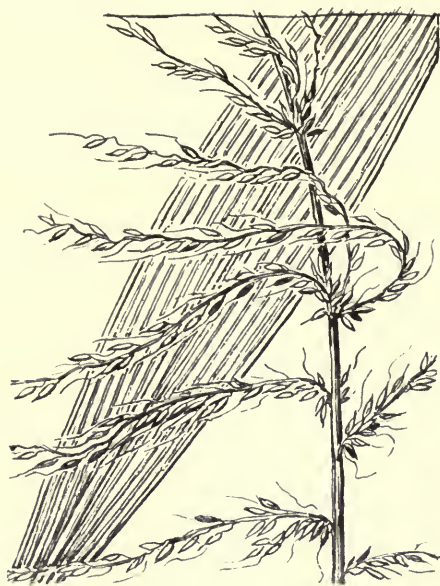


FIG. 95. *Setaria paniculifera*, $\times \frac{3}{4}$.

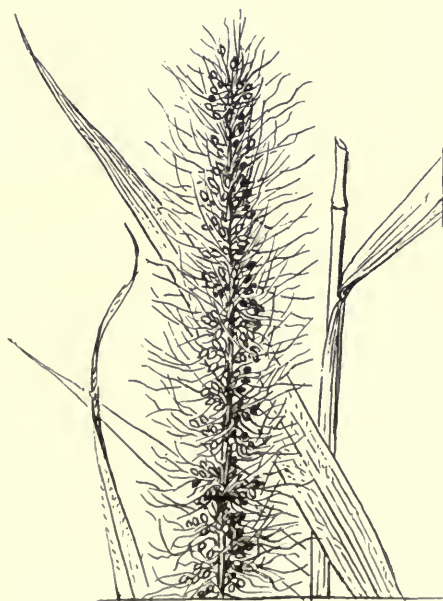


FIG. 96. *Setaria tenacissima*, $\times 1$.

Agrost. Bras. 247. 1829. *P. sphaerocarpum* Saltz. ex Steud. Syn. Pl. Glum. 1: 51. 1854. *Chaetochloa salzmanniana* Hitchc. Contr. U. S. Nat. Herb. 17: 265. 1913. *C. impressa* Hitchc. & Chase, Contr. U. S. Nat. Herb. 18: 350. 1917. *C. tenax* Hitchc. Contr. U. S. Nat. Herb. 22: 176. 1920.

Brushy rocky slopes and sandy pine-oak uplands, about 850 meters; Jutiapa (Jutiapa). British Honduras (Mountain Pine Ridge, El Cayo District); southeastern Mexico; Honduras; Panama; West Indies; Venezuela to French Guiana and Brazil; Bolivia (Nor-Yungas), Paraguay, and Argentina (Chaco).

Densely tufted perennial; culms 1–1.5 meters high, stiffly erect, scabrous below the panicle; sheaths compressed, keeled, hirsute, hispid on the collar, all much longer than the internodes; ligule densely ciliate, about 2 mm. long; blades as much as 35 cm. long, 2 cm. wide, long-acuminate, narrowed toward the base, scabrous, especially on the margins; panicles 15–30 cm. long, erect, densely spike-like or rather loose, narrowed above, the axis scabrous and rather densely villous, the branches appressed or stiffly ascending, the lower ones 1.5–3 cm. long; bristles 1 or 2 below each spikelet, 1–2 cm. long, antrorsely and retrorsely barbed; spikelets 2–2.5 mm. long, subspherical, appearing inflated; first glume broad, obtuse or subacute, apiculate, 5-nerved; second glume two-thirds as long as the spikelet, obtuse; sterile lemma as long as the fruit, the palea well developed; fruit turgid, minutely crested, finely cross-wrinkled.

Setaria verticillata (L.) Beauv. Ess. Agrost. 51, 178. 1812. *Panicum verticillatum* L. Sp. Pl. ed. 2. 1: 82. 1762. *Ixophorus verticillatus* Nash, Bull. Torrey Club 22: 422. 1895. *Chaetochloa verticillata* Scribn. U. S. Dept. Agr. Div. Agrost. Bull. 4: 39. 1897.

Common weed in gardens and coffee plantations; Sacatepéquez (Antigua). Temperate and warm regions of both hemispheres. Introduced in America.

Annual; culms erect or spreading, freely branching, mostly 15–50 cm. long; sheaths smooth; blades thin, flat, 4–15 cm. or even 20 cm. long, 4–12 mm. wide, scabrous, sometimes pilose; panicles mostly 2–5 cm. long, rarely as much as 15 cm., dense, subcylindric, more or less lobed; spikelets 2 mm. long, oblong-elliptic, glabrous, subtended by a single bristle as much as 10 mm. long, retrorsely scabrous to the base; fertile lemma finely cross-wrinkled.

Setaria vulpiseta (Lam.) Roem. & Schult. Syst. Veg. 2: 495. 1817. *Panicum vulpisetum* Lam. Encycl. 4: 735. 1798. *Setaria composita* H.B.K. Nov. Gen. & Sp. 1: 111. 1815. *S. polystachya* Schrad. ex Schult. Mant. 2: 277. 1824. *Chamaeraphis composita* Kuntze ex Beal, Grasses N. Amer. 2: 154. 1896. *Chaetochloa composita* Scribn. U. S. Dept. Agr. Div. Agrost. Bull. 4: 39. 1897. *C. vulpiseta* Hitchc. & Chase, Contr. U. S. Nat. Herb. 18: 350. 1917. Figure 97.

Open ground, moist thickets, and brushy slopes; Huehuetenango. British Honduras; southern Mexico; Honduras; El Salvador; Nicaragua; Costa Rica; Panama; West Indies; Peru and Argentina.

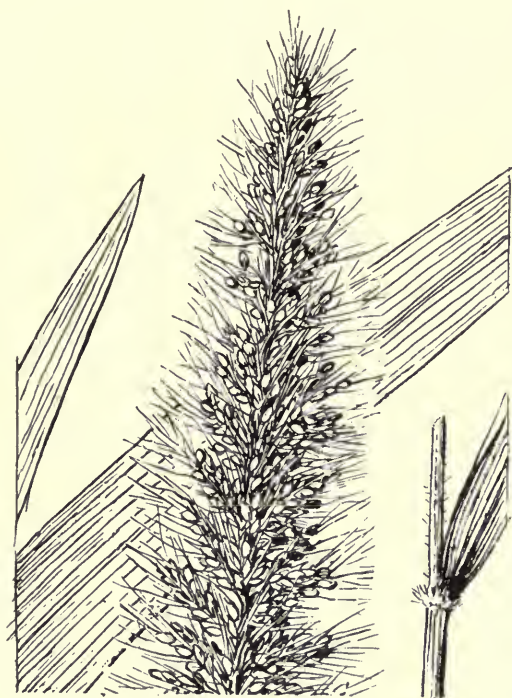


FIG. 97. *Setaria vulpiseta*, $\times 1$.

Coarse perennial; culms in large tufts, erect or geniculate and rooting at the lower nodes, branching, as much as 2 meters high, glabrous; sheaths usually much longer than the internodes, compressed, keeled, glabrous to rather densely hirsute, with a dense hispid line on the collar; ligule densely hispid, 2 mm. long; blades as much as 50 cm. long, 2–3.5 cm. wide, acuminate, narrowed to a usually rather long, often petiolate base, scabrous, especially on the lower surface, the margins sharply scabrous; panicles 15–30 cm. long, as much as 6 cm. wide including the bristles, somewhat narrowed toward the apex, the axis densely villous, the branches slender, compound, crowded, ascending or spreading; bristles 1 or 2 below each spikelet, 1–2 cm. long, yellowish or brownish; spikelets 2–2.5 mm. long; first glume obtuse or acutish, 3-nerved, about half as long as the spikelet, the second obtuse, 7-nerved, about two-thirds as long as the spikelet; sterile lemma as long as the spikelet, 5-nerved; fruit rather strongly transversely rugose, acute, minutely crested.

Setaria yucatana Herrm. Beitr. Biol. Pflanz. 10: 51. 1910.

Open ground, roadsides, and cultivated fields. British Honduras (Corozal District); Yucatan.

Annual; culms erect or ascending, sometimes rooting at the lower nodes, branching, 1–1.5 meters tall; sheaths papillose-pilose or only papillose, the margins ciliate; blades softly pubescent, the margins scabrous, 10–25 cm. long, 5–10 mm. wide; panicles oblong, tapering above, 10–30 cm. long, the branches ascending, densely flowered to the base, the lowermost 1–3 cm. long; spikelets 1.8 mm. long, the fertile lemma minutely rugose.

SETARIOPSIS Scribn.

Spikelets short-pedicellate, inflated; first glume obtuse or broadly acute, 5–7-nerved, about one-fourth as long as the spikelet; second glume 11–15-nerved, cordate, very broad, the margins spreading, wing-like; sterile lemma longer and narrower than the second glume, acute, more or less contorted at the base; fertile lemma ovate, acute, strongly transversely rugose, the margins inrolled.

Annuals with flat blades and narrow panicles, the short branches terminating in a long bristle.

Species 2, in Mexico, one extending to Central America and northern South America.

Setariopsis auriculata (Fourn.) Scribn. in Millsp. Field Mus. Bot. 1: 289. 1896. *Setaria auriculata* Fourn. Mex. Pl. 2: 43. 1886. *S. pauciseta* Vasey, Bull. Torrey Club 13: 230. 1886. Figure 98.

Grassy plains at low altitudes; Zacapa. Mexico; Honduras; Colombia; Venezuela.

Annual; culms 20–60 cm. high, erect or ascending, branching; sheaths shorter than the internodes, keeled, pubescent; blades 4–15 cm. long, 3–10 mm. wide, scabrous or pubescent; panicles 3–15 cm. long, interrupted, the short, usually densely flowered branches ascending or appressed, the bristles as much as 10 mm. long; spikelets 3–4 mm. long.

SORGHASTRUM Nash

Spikelets nearly terete, in pairs, one sessile, perfect, the other wanting, only the hairy pedicel present; glumes subindurate, the first hairy, the margins partly enclosing the second; sterile and fertile lemmas hyaline, the latter deeply lobed, awned from between the lobes, the awn usually geniculate, twisted.

Annuals or perennials with narrow blades and panicles of short few-jointed racemes, usually purplish or brownish, sometimes pale.

Species about 15, five in Africa, the rest in temperate and tropical America.



FIG. 98. *Setariopsis auriculata*. Plant, $\times \frac{1}{2}$; inflorescence, $\times 4$; spikelet, $\times 10$.

Plants annual; culms decumbent-spreading, rooting at the lower nodes.

S. incompletum.

Plants perennial; culms erect.

Spikelets dark brown; awn well developed, 13–20 cm. long *S. brunneum*.

Spikelets pale or golden; awn very short, sometimes as long as the spikelet.

S. setosum.

Sorghastrum brunneum Swallen, Contr. U. S. Nat. Herb. 29: 428. 1949. Figure 99.

Hills, oak forests, and brushy slopes, 1,500–2,500 meters; Huehuetenango, the type collected in mountains west of Aguacatán, Standley 81290. Mexico (Hidalgo and Guerrero).

Perennial; culms erect, 115 cm. high, glabrous, the nodes densely short-bearded; sheaths elongate, mostly longer than the internodes, glabrous, or sparsely pilose on the margins; ligule 3–5.5 mm. long, ciliate, decurrent; blades 15–30 cm. long, 5–6 mm. wide, scabrous; panicle 20 cm. long, the flexuous branches in distant fascicles, the lowermost as much as 7 cm. long, with short ones intermixed, pilose in the axils, glabrous or somewhat scabrous; spikelets 5–6 mm. long, chestnut brown, sparsely to rather densely hispid with white hairs; glumes obtuse, the first a little shorter than the second, the tip ciliate; fertile lemma awned from between the teeth of the rather deeply bifid apex, glabrous, not ciliate, the awn 13–16 mm. long, twice geniculate, tightly twisted below the second bend, hispid, the terminal segment straight or nearly so, scabrous; anthers 2 mm. long.

Sorghastrum incompletum (Presl) Nash, N. Amer. Fl. 17: 130. 1912. *Andropogon incompletus* Presl, Rel. Haenk. 1: 342. 1830. *A. nutans* var. *incompletus* Hack. in DC. Monogr. Phan. 6: 531. 1889.

Open banks, grassy slopes and meadows, and rocky pine-clad hills, 900–1,900 meters; Chiquimula; Jalapa; Santa Rosa; Guatemala; Chimaltenango. Mexico to Colombia and Venezuela; tropical Africa.

Slender annual; culms erect or ascending from a somewhat decumbent base, sometimes rooting at the lower nodes, commonly 20–50 cm., but sometimes as much as 2 meters high, simple or branching from the base, glabrous, the nodes appressed-pubescent; sheaths rounded or keeled toward the summit, glabrous; ligule firm, 0.5–2 mm. long; blades commonly 6–15 cm. long, 2–4 mm. wide, but on larger plants as much as 25 cm. long and 8 mm. wide, pustulose or papillose-roughened, usually pilose on the upper surface, the margins scabrous; panicles 5–20 cm. long, the slender rather distant branches ascending, the secondary branches and peduncles of the short racemes very slender or filiform, flexuous or tortuous, the peduncles glabrous or sparsely covered with long hairs; spikelets 3.5–5 mm. long; first glume usually truncate, the tip minutely hispidulous, hirsute on the back, sometimes only near the base; rachis joints and pedicels densely ciliate with white or yellowish hairs; awns 2–4.5 cm. long, twice-geniculate, the two lower segments tightly twisted, usually villous, dark brown.



FIG. 99. *Sorghastrum brunneum*. Inflorescence, $\times 2$; spikelet, $\times 5$.

Sorghastrum setosum (Griseb.) Hitchc. Contr. U. S. Nat. Herb. 12: 195. 1909. *Andropogon setosus* Griseb. Cat. Pl. Cuba 235. 1866. *Sorghastrum parviflorum* Hitchc. and Chase, Contr. U. S. Nat. Herb. 18: 287. 1917.

Sandy pine uplands, about 500 meters; Petén. British Honduras; southern Mexico; Honduras; West Indies; Venezuela to Bolivia, Brazil, and Argentina.

Perennial; culms slender, erect, commonly 1-1.5 meters high, sometimes with rather strong rhizomes, the nodes densely appressed-bearded; sheaths usually shorter than the internodes, glabrous; blades elongate, attenuate, 2-5 mm. wide, the margins hispid; panicles 15-25 cm. long, rarely less, with capillary, ascending, flexuous branches; spikelets pale to golden brown, 4-5 mm. long; first glume sparsely pilose with long hairs; awn very short to about as long as the spikelet, straight or twisted and geniculate.

SORGHUM Moench

Spikelets in pairs, one sessile and fertile, the other pedicellate, usually staminate, the pairs at the nodes of the tardily disarticulating rachis of short, few-jointed, panicle racemes, the terminal sessile spikelet with 2 pedicellate spikelets; glumes of fertile spikelet indurate, the first rounded, somewhat keeled at the summit; fertile lemma awnless or with a short, usually geniculate, twisted awn; pedicellate spikelets herbaceous, lanceolate, the first glume several-nerved, 2-keeled in the upper half.

Annuals or perennials, with long narrow or wide blades and open, often large panicles of short racemes.

Species probably about 35, mostly in tropical Africa.

Plants annual. *S. vulgare*.

Plants perennial.

Culms erect from strong rhizomes; panicle branches stiffly ascending.

S. halepense.

Culms tufted, without rhizomes; panicle branches very slender, conspicuously flexuous; racemes golden or reddish brown. *S. trichocladium*.

Sorghum halepense (L.) Pers. Syn. Pl. 1: 101. 1805. *Holcus halepensis* L. Sp. Pl. 1047. 1753. *Andropogon halepensis* Brot. Fl. Lusit. 1: 89. 1804. Figure 100.

In partially cleared pasture, Finca Las Tinajas, Panzos, Alta Verapaz. A common weed in fields and waste places, southeastern United States, Mexico, and the West Indies to Chile and Argentina. Originally from the Mediterranean region.

Perennial with numerous strong rhizomes; culms erect, usually 1-1.5 meters high, the nodes appressed-pubescent; sheaths usually shorter than the internodes,



FIG. 100. *Sorghum halepense*. Plant, $\times \frac{1}{2}$; two views of terminal raceme, $\times 5$.

rounded, glabrous; ligule membranaceous, ciliate, about 2 mm. long; blades elongate, commonly 1–1.5 cm. wide, smooth on both surfaces, the margins somewhat scabrous, the midrib prominent; panicles 15–30 cm. long, the branches ascending or spreading, naked below; spikelets 5 mm. long, acute, rather easily and cleanly disarticulating from the pedicel, the first glume indurate, pubescent the awn, when present, 1–1.5 cm. long, deciduous.

Sorghum trichocladum (Rupr.) Kuntze, Rev. Gen. Pl. 2: 792. 1891. *Andropogon trichocladus* Rupr. in Hack. in DC. Monogr. Phan. 6: 525. 1889. *Holcus trichocladus* Nash, N. Amer. Fl. 17: 131. 1912.

Oak forest along road between Chimaltenango and San Martín Jilotepeque, Chimaltenango, 1,500–1,700 meters, *Standley* 80857. Southern Mexico; Honduras.

Perennial; culms tufted, erect, commonly 1–1.5 meters high, appressed-hairy below the panicle, the nodes densely and conspicuously bearded with usually long, spreading, silky hairs; sheaths glabrous, becoming densely pilose or papillose-pilose toward the summit, the collar very densely hairy; blades elongate, 3–8 mm. wide, narrowed toward the base, with a prominent white midnerve, softly pilose, densely ciliate at the base with long hairs; panicles 10–20 cm. long with rather distant fascicles of slender or filiform, very flexuous branches; racemes 1.5–3 cm. long, the sessile spikelets densely covered with golden or reddish brown hairs; awn 1.5–2 cm. long, twisted, twice geniculate; pedicellate spikelet narrow, inconspicuous, pilose, awnless.

Sorghum vulgare Pers. Syn. Pl. 1: 101. 1805. *Holcus sorghum* Brot. Fl. Lusit. 1: 88. 1804.

Probably escaped from cultivation; Petén; Sacatepéquez. Cultivated in warm regions of both hemispheres.

Annual; culms coarse, erect, with broad flat blades and small to large, dense, heavy panicles; spikelets ovate, rather densely hairy, awned or awnless.

An extremely variable species with numerous horticultural varieties.

Broomcorn, **Sorghum vulgare** var. **technicum** (Koern.) Jav., was found to occur occasionally in old fields near Barbarena, Santa Rosa, *Cutler* 4308.

SPARTINA Schreb.

Spikelets 1-flowered, laterally compressed, sessile in two rows on one side of a narrow flattened rachis, disarticulating below the glumes; glumes unequal, the first shorter, the second longer than the floret, keeled, 1-nerved, subobtusely, acute, or acuminate, rarely awned, usually pilose or hispid on the keel; lemma firm but thinner than the glumes, 1-nerved, or 3-nerved with the lateral nerves

obscure, keeled, subobtuse, more or less pilose or hispid on the keel; palea as long as or longer than the lemma, broadly acute, with thin, very wide margins.

Coarse, usually tall, perennial grasses, mostly with strong scaly rhizomes, tough, flat or involute blades, and several to numerous, appressed, ascending or spreading spikes racemose on a common axis, the rachis produced beyond the spikelets.

Species 16, mostly American.

Spartina spartinae (Trin.) Merr. U. S. Dept. Agr. Bur. Pl. Ind. Bull. 9: 11. 1902. *Vilfa spartinae* Trin. Mém. Acad. St. Pétersb. VI. 4(1): 82. 1840. *Spartina gouini* Fourn. Mex. Pl. Gram. 2: 135. 1886. *S. pittieri* Hack. Oesterr. Bot. Zeitschr. 52: 237. 1902.

Marshes and swamps near the coast; Belize, Belize District, British Honduras, *Lundell* 4718. Not known from Guatemala. Florida to Texas; Mexico; Costa Rica; Paraguay and Argentina.

Culms 30–175 cm. tall, erect, in usually large dense clumps; sheaths longer than the internodes, rounded on the back; ligule densely ciliate, 1 mm. long; blades elongate, 3–5 mm. wide at the base, narrower than the mouth of the sheath, often tortuous, pungent, the lower surface glabrous, the upper surface and the margins scabrous; panicle 10–40 cm. long, usually dense, cylindric; spikes numerous, 2–8 cm. long, sessile, appressed, the rachis scabrous on the margins; spikelets 6–7 mm. long, crowded; glumes acute to obtuse, sometimes minutely lobed and mucronate, scabrous on the keels, the first a little shorter than the lemma, or rarely only half as long, the second a little longer than the lemma; lemma 5–6 mm. long, obtuse, scabrous on the keel; palea equal to the lemma.

SPOROBOLUS R. Br.

Spikelets 1-flowered, the rachilla disarticulating above the glumes; glumes awnless, subequal or usually very unequal, the second often as long as the spikelet; lemma 1-nerved, acute to obtuse, glabrous, awnless; palea as long as or sometimes longer than the lemma; caryopsis readily falling from the spikelet at maturity, the pericarp free from the seed.

Annuals or perennials, with open or contracted, often spikelike panicles.

Species about 100, in warm temperate and tropical regions of both hemispheres.

Plants annual. *S. macrospermus*.

Plants perennial.

Panicles diffuse, the slender branches naked below; spikelets 1.4 mm. long.

S. buckleyi.

Panicles dense or spikelike, or if open, not diffuse.

Culms wiry, creeping, with hard scaly rhizomes. *S. virginicus*.

Culms caespitose, erect, without rhizomes.

Panicle branches verticillate; glumes unequal, the second as long as the spikelet.

Spikelets 1 mm. long *S. pyramidatus*.

Spikelets 3-4 mm. long.

Panicle branches ascending to spreading, naked below . . . *S. cubensis*.

Panicle branches appressed, floriferous to the base . . . *S. purpurascens*.

Panicle branches not verticillate; glumes equal or subequal, much shorter than the spikelet.

Panicles dense, spike-like; spikelets 2-2.4 mm. long *S. poiretii*.

Panicles scarcely dense, the slender branches ascending to spreading; spikelets 1.6-1.8 mm. long *S. indicus*.

***Sporobolus buckleyi* Vasey, Bull. Torrey Club 10: 128. 1883.**

Moist woods and shady places, British Honduras (Corozal and Orange Walk districts). Not known from Guatemala. Southeastern Texas and eastern Mexico.

Perennial; culms erect, 40-130 cm. high; sheaths compressed, keeled, densely hairy on the collar; blades 15-45 cm. long, 5-10 mm. wide, attenuate, glabrous, the margins scabrous; panicles diffuse, as much as 50 cm. long, the very slender branches ascending to drooping, naked in the lower half, the short branchlets appressed or somewhat spreading; spikelets 1.4 mm. long, short-pedicellate, approximate; glumes acute, the second nearly as long as the floret, the first about half as long; lemma acute.

***Sporobolus cubensis* Hitchc. Contr. U. S. Nat. Herb. 12: 237. 1909.**

Pine ridges, British Honduras (Belize, El Cayo, and Toledo districts). Not known from Guatemala. Southern Mexico; Costa Rica; Panama; West Indies; Colombia to British Guiana and Bolivia.

Perennial; culms densely tufted, erect, 30-60 cm. high; lower sheaths crowded, becoming reddish-brown with age, conspicuously and densely ciliate with long hairs on the margins, the culm sheaths shorter than the internodes, glabrous; blades flat or folded, 10-30 cm. long, 2-4 mm. wide, tapering toward the base, narrower than the mouth of the sheath, papillose or papillose-ciliate on the margins toward the base; panicles mostly 8-12 cm. long, open, the short branches verticillate, spreading to reflexed, bearing 1-3 spikelets; spikelets 3-4 mm. long; first glume narrow, acuminate, about half as long as the spikelet, the second much broader, acute, as long as the lemma.

***Sporobolus indicus* (L.) R. Br. Prodr. Fl. Nov. Holl. 170. 1810. *Agrostis indica* L. Sp. Pl. 63. 1753. *Sporobolus jacquemontii* Kunth, R v. Gram. 2: 427. pl. 127. 1831.**



FIG. 101. *Sporobolus poiretii*. Plant, $\times \frac{1}{2}$; spikelet and floret, $\times 10$.

Sandy pine uplands, brushy and waste places; Suchitepéquez. British Honduras (Belize and El Cayo districts); Mexico and the West Indies to Colombia and Brazil.

Perennial; culms slender, in large clumps, about 1 meter high; blades narrow, elongate, attenuate to a fine point, usually flexuous, flat or becoming loosely rolled; panicles 15–30 cm. long, attenuate toward the tip, the slender branches ascending or spreading; spikelets 1.6–1.8 mm. long, short-pedicellate, subsecund on the under side of the branches; glumes subequal, obtuse, 0.3–0.5 mm. long.

Sporobolus macrospermus Scribn. ex Beal, Grasses N. Amer. 2: 302. 1896.

Known in Guatemala only from Laguna de Ayarza, Jalapa, Heyde & Lux 3925. Southern Mexico.

Annual; culms 15–30 cm. high, slender, erect or geniculate at the base, simple or branching from the lower nodes; sheaths crowded toward the base, glabrous, the uppermost elongate with a reduced blade; ligule ciliate, very short; blades mostly less than 5 cm. long, 1–3 mm. wide, sparsely ciliate, glabrous, or sparsely pilose on the upper surface; panicles 3–8 cm. long, the slender spreading branches verticillate, 1–2 cm. long, few-flowered, spikelet-bearing in the upper half; spikelets about 2 mm. long, the second glume as long as the floret, the first narrow, one-third to half as long as the floret.

Sporobolus poiretii (Roem. & Schult.) Hitchc. *Bartonia* 14: 32. 1932. *Axonopus poiretii* Roem. & Schult. *Syst. Veg.* 2: 318. 1817. *Agrostis tenuissima* Spreng. *Syst. Veg.* 1: 258. 1825. *Vilfa berteroaana* Trin. *Mém. Acad. St. Pétersb. VI. Sci. Nat.* 4 (1): 100. 1840. *Sporobolus berteroaanus* Hitchc. & Chase, *Contr. U. S. Nat. Herb.* 18: 370. 1917. *Sacapasto* (Guatemala). Figure 101.

Grassy slopes and ridges, wet meadows, sand bars, fields and roadsides, up to 2,700 meters; Alta Verapaz; Izabal; Chiquimula; Jalapa; Santa Rosa; Guatemala; Chimaltenango; Quezaltenango. Tropical and subtropical America; tropical Asia.

Perennial; culms 1–1.5 meters high, glabrous; leaves mostly crowded toward the base; blades flat, elongate, attenuate, often flexuous toward the ends, mostly 3–5 mm. wide; panicles 20–35 cm. long, plumbeous, dense, the branches appressed, floriferous to the base or nearly so; spikelets 2–2.4 mm. long; glumes obtuse, the first 0.5 mm. long, the second 0.7–1 mm. long.

Sporobolus purpurascens (Swartz) Hamilt. *Prodr. Pl. Ind. Occ.* 5. 1825. *Agrostis purpurascens* Swartz, *Prodr. Veg. Ind. Occ.* 25. 1788. *Vilfa purpurascens* Beauv. *Ess. Agrost.* 16, 182. 1812. *V. grisebachiana* Fourn. *Mex. Pl.* 2: 98. 1886. *V. liebmanni* Fourn. *Mex. Pl.* 2: 100. 1886.

Known in Guatemala only from Cobán, Alta Verapaz, collected by *von Tuerckheim*. Southern Texas; eastern Mexico; Honduras; Costa Rica; West Indies; Colombia; Ecuador; Peru.

Perennial; culms erect, glabrous, 30–60 cm. high; sheaths glabrous; blades commonly 5–15 cm. long, rarely to 23 cm., 1–4 mm. wide, rarely to 8 mm., flat, papillose-ciliate or papillose only; panicles 7–15 cm. long, contracted, dark brown or purple, the branches verticillate, appressed or somewhat ascending, floriferous to the base, the lower ones 1–2 cm. long; spikelets 3–4 mm. long, glabrous; first glume acuminate, about half as long as the spikelet, the second as long as the lemma.

Sporobolus pyramidatus (Lam.) Hitchc. U. S. Dept. Agr. Misc. Pub. 243: 84. 1936. *Agrostis pyramidata* Lam. Tabl. Encycl. 1: 161. 1791. *Vilfa arguta* Nees, Agrost. Bras. 395. 1829. *Sporobolus argutus* Kunth, Rév. Gram. 1: Suppl. 17. 1830.

Moist salt flats and wet places, 200–650 meters; Zacapa; Jutiapa. Colorado and Kansas to Texas and Louisiana; West Indies; Mexico to Nicaragua; Colombia to Brazil and Argentina.

Perennial; culms densely tufted, erect or somewhat spreading, 10–70 cm. high; sheaths glabrous, with a few long hairs in the throat; blades 3–15 cm. long, 1–3 mm. wide, rarely as much as 4 mm., glabrous, scabrous on the margins, the uppermost greatly reduced; panicles 3–12 cm. long, pyramidal, the branches ascending or finally spreading, at least some of them naked at the base; spikelets about 1 mm. long, short-pedicellate, appressed; first glume 0.3–0.5 mm. long, obtuse; second glume as long as the lemma or a little shorter; lemma acute or subacuminate.

Sporobolus virginicus (L.) Kunth, Rév. Gram. 1: 67. 1829. *Agrostis virginica* L. Sp. Pl. 63. 1753. *A. littoralis* Lam. Tabl. Encycl. 1: 161. 1791. *Vilfa virginica* Beauv. Ess. Agrost. 16, 182. 1812. *Sporobolus littoralis* Kunth, Rév. Gram. 1: 68. 1829.

Salt marshes and sandy seacoasts; Izabal. British Honduras; Honduras; Costa Rica; Panama; southern Florida and the West Indies to Brazil and Chile.

Extensively creeping, tough, wiry perennial with hard scaly rhizomes; culms slender to rather stout, 50–70 cm. or even as much as 1 meter long, with short internodes; sheaths glabrous; blades conspicuously distichous, mostly 8–12 cm. long, 3–5 mm. wide at the base, becoming loosely rolled or involute, gradually narrowed to a rather fine but firm point; panicles densely spikelike, 6–10 cm. long, 0.5–1 cm. thick, usually partly enclosed in the sheath; spikelets 2.5 mm. long, rarely longer; glumes acute, subequal, the second as long as the floret, the first a little shorter.

STENOTAPHRUM Trin.

Spikelets sessile or subsessile, solitary in two rows on one side of a flattened rachis, the racemes reduced to 1–3 spikelets, the rachis produced beyond the upper

spikelet, the prolongation about as long as the spikelet, the short racemes imbedded (in our species) on two sides of a thickened corky axis; first glume about one-fourth as long as the spikelet; second glume and sterile lemma equal, pointed beyond the fruit, acuminate, 5-nerved, the lemma enclosing a palea or staminate flower; fruit acute, chartaceous, the margins of the lemma thin, not inrolled.

Coarse, wiry, branching, stoloniferous perennial with flat obtuse blades, and solitary, terminal and axillary, thickened, false racemes.

Species 6, Africa, Australia, and the Pacific Islands, one in the American tropics.

Stenotaphrum secundatum (Walt.) Kuntze, Rev. Gen. Pl. 2: 794. 1891. *Ischaemum secundatum* Walt. Fl. Carol. 249. 1788. *Stenotaphrum americanum* Schrank, Pl. Rar. Hort. Monac. pl. 98. 1822. *S. sarmentosum* Nees, Agrost. Bras. 93. 1829. *S. dimidiatum* var. *americanum* Hack. in Stuck. Anal. Mus. Nac. Buenos Aires 21: 57. 1911. Figure 102.

Sandy ground, British Honduras. Probably to be found in Guatemala. Southern United States and the West Indies to Argentina; Africa; Hawaii; Pacific Islands; Australia.

Coarse, tough, wiry, stoloniferous perennial; culms compressed, erect from usually arching stolons, 5-50 cm. high, the long internodes alternate with a series of very short ones, making the leaves in groups; sheaths broad, compressed, keeled, glabrous, sometimes ciliate on the margins, with a small tuft of hairs in the throat; blades flat, conduplicate, obtuse, 2-15 cm. long, as much as 15 mm. wide unfolded, glabrous, the margins scabrous at the tip; racemes terminal on the main culm and short branches from the upper nodes, mostly 4-10 cm. long, straight or curved, the thick rachis 3-4 mm. wide; spikelets 4-6 mm. long, acuminate, glabrous, the first glume obtuse, one-third to one-half as long as the spikelet.

STIPA L.

Spikelets 1-flowered, the rachilla disarticulating above the glumes, the articulation oblique, leaving a sharp-bearded callus on the floret; glumes equal, thin, longer than the floret; lemma indurate, terete, terminating in a usually twice-geniculate awn, the summit sometimes with a more or less distinct smooth crown.

Perennials with usually involute blades and narrow or open panicles.

Species about 150, in temperate regions of both hemispheres.

Panicles narrow, dense, silvery; lemma with conspicuous long hairs at the summit. *S. ichu*.

Panicles open, the branches naked at least toward the base; lemma without long hairs at the summit.

Lemma 5-6 mm. long, dark brown at maturity.....*S. virescens*.

Lemma 2.5 mm. long, pale.....*S. linearifolia*.



FIG. 102. *Stenotaphrum secundatum*. Plant, $\times \frac{1}{2}$; two views of spikelet, and fertile floret, $\times 10$.

Stipa ichu (Ruiz & Pav.) Kunth, Rév. Gram. 1: 60. 1829. *Jarava ichu* Ruiz & Pav. Fl. Peruv. Chil. 1: 5. pl. 6, f. b. 1798. *Stipa liebmanni* Fourn. Mex. Pl. 2: 76. 1886. *Pajón* (Quezaltenango).

Plateaus, open rocky slopes, open pine and oak forests, sometimes dominant on volcanic ash, 1,500–3,500 meters; Sacatepéquez; Quezaltenango; Quiché; San Marcos. Southern Mexico; Costa Rica; Colombia and Venezuela to Argentina.

Perennial; culms erect in large dense clumps, 60–120 cm. high, glabrous; sheaths scaberulous, with long hairs at the throat and sometimes on the collar; blades elongate, firm, scabrous, somewhat curved or flexuous, those of the culm sometimes flat; panicle 15–40 cm. long, shining, pale or purplish, the numerous densely flowered branches ascending or appressed, very scabrous; glumes about 1 cm. long, attenuate, thin, hyaline, faintly 3-nerved; lemma about 2.5 mm. long, pubescent, bearing at the summit conspicuous hairs 3–4 mm. long, the awn 1–2 cm. long, slender, flexuous or obscurely twice-geniculate, more or less twisted in the lower part.

Stipa linearifolia Fourn. Mex. Pl. 2: 73. 1886.

Damp thickets and oak-pine forests, 2,500–3,000 meters; Quezaltenango. Southern Mexico. Infrequent.

Perennial; culms slender, erect or decumbent at the base, 50–140 cm. high, 3–4-noded, glabrous; blades linear, involute, or the culm blades flat, as much as 5 mm. wide, scaberulous; panicles 12–20 cm. long, the slender branches distant, solitary or in pairs, ascending to spreading, sometimes naked for nearly half the length; glumes thin, 3-nerved, obtuse to acutish, 3–4 mm. long; fruit 2.5–3.5 mm. long, fusiform, pilose, with an indistinct crown, the awn 12–18 mm. long, twice-geniculate, rather readily deciduous.

Stipa virescens H.B.K. Nov. Gen. & Sp. 1: 126. 1815. *S. caerulea* Presl, Rel. Haenk. 1: 227. 1830. *S. arsenii* Hack. Repert. Nov. Sp. Fedde 8: 515. 1910.

Dry pine woods, 1,800–3,000 meters; Chimaltenango; Quiché; Huehuetenango; San Marcos. Mexico.

Perennial; culms erect in large tufts, 60–120 cm. high; sheaths glabrous, usually much shorter than the internodes; ligule 1–2 mm. long, decurrent; blades 10–40 cm. long, rarely shorter, scabrous or sometimes nearly smooth, firm, involute, or those of the culm flat, 1–2 mm. wide; panicle 10–30 cm. long, narrow, the slender distant branches ascending or appressed, sometimes flexuous, bearing one to few spikelets; glumes 7–8 mm. long, pale or purple, abruptly acuminate; lemma 5–6 mm. long, dark brown at maturity, densely villous with brown hairs, the callus 1 mm. long, densely bearded, the summit with a row of stiff, erect, brown hairs; awn 1–2 cm. long, twice-geniculate, twisted to the second bend.

STREPTOCHAETA Schrad.

Spikelets 1-flowered, terete, disarticulating below the glumes; empty bractlets (probably glumes and sterile lemmas) 4, much shorter than the spikelet, more or less toothed; lemma indurate, gradually narrowed into a long, much-contorted awn; palea shorter than the lemma, bifid to the base, indurate like the lemma; inner bracts (lodicules) 3, imbricate, longer than the palea, firm but less indurate than the lemma and palea; stamens 6, monodelphous, the tube about as long as the lemma; style 1, stigmas 3.

Broad-leaved perennials with the spikelets usually in elongate spikes.

Species 2, in tropical America.

Blades 6–9 cm. wide; spikelets, excluding awns, about 14 mm. long; spike dense, usually many-flowered. *S. sodiroana*.

Blades 3–4.5 cm. wide; spikelets, excluding awns, about 22 cm. long; spike few-flowered, the spikelets distant. *S. spicata*.

Streptochaeta sodiroana Hack. Oesterr. Bot. Zeitschr. 40: 113. 1890.

Forests, Temash River, British Honduras. Not known from Guatemala. Honduras; Costa Rica; Panama; Ecuador.

Perennial; culms erect or rarely decumbent at the base and rooting at the lower nodes, 60–100 cm. high, densely pubescent below the inflorescence; lower sheaths much shorter than the internodes, the upper ones crowded, flattened but scarcely keeled, glabrous, broadened at the truncate, more or less auriculate, densely ciliate mouth; ligule obsolete; blades 18–30 cm. long, 6–9.5 cm. wide, petiolate, asymmetrical, rather abruptly acute or acuminate, glabrous; spike 20–30 cm. long, about 1 cm. thick, densely many-flowered, the axis and the pedicels of the spikelets conspicuously hispid; spikelets appressed, somewhat obscured by the awns; lower bracts very short, obscure, irregularly lobed; lemma about 12 mm. long, tapering into an awn 10 cm. long, the lower part (about 6 cm.) nearly straight, the upper part much finer, minutely but conspicuously contorted; palea 8–9 mm. long, the lobes acute, somewhat spreading at the tip; lodicules unequal, 13–15 mm. long, somewhat exceeding the lemma.

Streptochaeta spicata Schrad. ex Nees, Agrost. Bras. 537. 1829. Figure 103.

Wet woods in deep shade, near sea level; Izabal. Southern Mexico; Nicaragua; Panama; Trinidad; Venezuela; Ecuador; Paraguay; Brazil.

Perennial; culms 60–90 cm. high, simple or sparingly branched, pubescent at and below the nodes; lower sheaths shorter than the internodes, the upper somewhat crowded, pilose on the margins toward the base, hispid-ciliate at the mouth, often auriculate, the auricles as much as 7 mm. long; blades 8–15 cm. long, 2.5–4.5 cm. wide, acute, nearly symmetrical, glabrous; spike 10–12 cm. long, bearing 5–9 erect spikelets, the axis densely pubescent; spikelets 20–24 mm. long;

lower bracts 2-3 mm. long, the first two narrow, awned, the other two very broad, awnless, strongly nerved, irregularly dentate; lemma as long as or a little shorter than the lodicules, tapering into an awn 7-10 cm. long, becoming slender and finally contorted in the upper third; divisions of the palea acuminate, 14-15 mm. long.

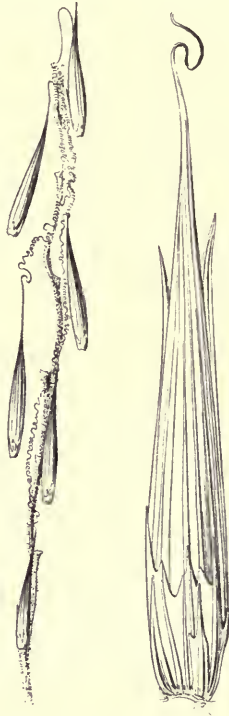


FIG. 103. *Streptochaeta spicata*. Inflorescence, $\times 1$; spikelet, $\times 5$.

THRASYA H.B.K.

Spikelets in pairs in two rows on one side of a narrow- to broad-winged rachis, turned back to back, the first subsessile, the second pedicellate, the pedicel adnate to the rachis, the spikelets thus appearing solitary; first glume small, sometimes hyaline; second glume usually shorter than the fruit, acute; sterile lemma indurate, sulcate and often splitting down the middle at maturity, enclosing a well-developed palea and usually a staminate flower; fruit indurate, striate, with a few stiff hairs at the tip, the margins narrow, firm, not inrolled.

Branching perennials with narrow flat blades and solitary, terminal and axillary, straight or usually curved racemes.

Species about 20, in tropical America.

Spikelets glabrous, 2.5–3 mm. long; racemes 4–8 cm. long; rachis 1.5–2 mm. wide.....*T. campylostachya*.

Spikelets villous, 4 mm. long; racemes 15–20 cm. long; rachis 3–4 mm. wide.

T. petrosa.

Thrasya campylostachya (Hack.) Chase, Proc. Biol. Soc. Washington 24: 115. 1911. *Panicum campylostachyum* Hack. Oesterr. Bot. Zeitschr. 51: 367. 1901. Figure 104.



FIG. 104. *Thrasya campylostachya*, about $\times \frac{1}{2}$.

Pine forests and ridges, to about 1,000 meters; Alta Verapaz; Izabal; Huehuetenango; Chiquimula. British Honduras (Toledo District); southern Mexico (Veracruz and Oaxaca) to Bolivia.

Perennial; culms slender, flattened, erect or straggling, often more than 1 meter long, glabrous or pubescent below the more or less bearded nodes; blades flat, 6–20 cm. long, 4–10 mm. wide, glabrous to softly pubescent, the margins sometimes hispid; racemes solitary, terminal and axillary on slender, long-exserted peduncles, arcuate, 4–8 cm. long, the rachis winged, 1.5–2 mm. wide; spikelets 2.5–3 mm. long, glabrous; first glume minute; second glume acute, two-thirds as long as the fruit.

Thrasya petrosa (Trin.) Chase, Proc. Biol. Soc. Washington 24: 115. 1911. *Panicum petrosum* Trin. Gram. Icon. 3: pl. 280. 1831. *Tylothrasya petrosa* Doell in Mart. Fl. Bras. 2 (2): 295. pl. 37. 1877.

Rocky slopes, 1,200–1,500 meters; Quezaltenango; Chiquimula. Panama to Peru, Brazil, and Paraguay.

Perennial; culms tufted, erect, 1–1.5 meters high, appressed-papillose-pilose, the nodes bearded; sheaths keeled, elongate, mostly longer than the internodes, glabrous to densely papillose-pilose, especially toward the summit; ligule brown, truncate, about 1 mm. long; blades elongate, mostly 4–6 mm. wide, acuminate or sometimes attenuate, narrowed toward the base, glabrous to more or less papillose or papillose-hirsute, the uppermost wanting or very much reduced; racemes 15–20 cm. long, curved, on long slender peduncles, the rachis winged, 3–4 mm. wide; spikelets 4 mm. long, villous; first glume minute; second glume longer than the fruit, acuminate; sterile lemma slightly shorter than the second glume, acute, sulcate, slightly divided at the summit, the palea prominent, nearly as long as the lemma; fertile lemma 3.5 mm. long, narrowly ovate, palea minutely striate, subacute.

TRACHYPOGON Nees

Spikelets in pairs at the nodes of a slender continuous rachis, one nearly sessile, staminate, awnless, the other pedicellate, perfect, long-awned; pedicel of the perfect spikelet obliquely disarticulating near the base, forming a sharp-bearded callus below the spikelet; first glume of perfect spikelet firm, rounded on the back, several-nerved, obtuse; second glume firm, obscurely nerved; fertile lemma narrow, extending into a stout, twisted, geniculate or flexuous, often plumose awn; sessile spikelet as large as the fertile spikelet, persistent, awnless.

Tufted perennials with terminal racemes, solitary or few, approximate on a short axis.

Species about 15, in warmer regions of America and Africa.

Spikelets rather distant, the conspicuous white callus hairs contrasting with the usually dark purple glumes of the fertile spikelets; awns short-hispid.

T. montufari.

Spikelets crowded, pale, the callus hairs inconspicuous; awns distinctly plumose.

Ligule about 1.5 mm. long, inconspicuous; blades stiffly spreading.

T. angustifolius.

Ligule 5–12 mm. long. *T. secundus*.

Trachypogon angustifolius (H.B.K.) Nees ex Hack. DC. Monogr. Phan. VI: 326. 1889. *Andropogon angustifolius* H.B.K. Nov. Gen. & Sp. 1: 184. 1816.

Open grassy plains, rocky slopes, and sandy pine uplands, up to 1,000 meters; Petén; Alta Verapaz; Izabal; Zacapa; Jutiapa. British Honduras; southern Mexico; Panama.

Perennial; culms slender, erect, 40–80 cm. high, the nodes appressed-bearded or sometimes nearly glabrous; sheaths glabrous, or the lower ones sparsely pilose; blades 5–20 cm. long, 1–4 mm. wide, narrowed toward the base, usually stiffly spreading; ligule firm, decurrent, not more than 1.5 mm. long; racemes solitary or rarely paired, 8–12 cm. long; fertile spikelets about 8 mm. long, the glumes pale, pubescent below, glabrous or nearly so toward the summit; awns 3–4.5 cm. long, plumose to the second bend, sometimes throughout.

Trachypogon montufari (H.B.K.) Nees, Agrost. Bras. 342. 1829. *Andropogon montufari* H.B.K. Nov. Gen. & Sp. 1: 184. 1816.

Barren or grassy slopes, shady banks, sometimes in cultivated places, 1,500–2,000 meters; Chiquimula; Guatemala; Sacatepéquez; Quezaltenango. British Honduras; Mexico; Colombia and Venezuela to Bolivia.

Perennial; culms tufted, erect, 30 cm. to more than 1 meter high, the nodes densely and conspicuously bearded with stiff, appressed hairs; sheaths usually much shorter than the internodes, glabrous; ligule firm, decurrent, 3–10 mm. long; blades attenuate, flat or loosely involute, 8–30 cm. long, not more than 5 mm. wide, usually less; racemes solitary or rarely paired, 8–15 cm. long; fertile spikelets about 1 cm. long, the glumes pubescent, usually purple; awns 3–5 cm. long, twice-geniculate, appressed-hispid.

Trachypogon secundus (Presl) Scribn. U. S. Dept. Agr. Div. Agrost. Circ. 32: 1. 1901. *Heteropogon secundus* Presl, Rel. Haenk. 1: 335. 1830. *Andropogon secundus* Kunth, Rév. Gram. 1: Suppl. xxxix. 1830. Figure 105.

Grassy plains, pine slopes, dry ridges, and rocky or brushy slopes, up to 2,500 meters; Izabal; Chiquimula; Jalapa; Jutiapa; Guatemala; Quezaltenango. Southwestern United States to Panama.

Perennial; culms densely tufted, erect, 0.5–1.5 meters high, the nodes inconspicuously bearded; sheaths glabrous or papillose-pilose, auriculate; ligule 5–12 mm. long, firm, the margins fused with the auricles of the sheaths; blades elongate, 2–5 mm. wide, flat or loosely rolled, attenuate, narrowed to an almost petiole-like base, scabrous or papillose-pilose; racemes 1 or 2, 10–20 cm. long;



FIG. 105. *Trachypogon secundus*. Plant, $\times \frac{1}{2}$; fertile spikelet, $\times 5$.

fertile spikelets 8–12 mm. long including the sharp-bearded callus; first glume rather densely pubescent, or nearly glabrous; awns 5–7 cm. long, the two lower segments conspicuously plumose.

TRICHACHNE Nees

Spikelets lanceolate, rather distant, in pairs in two rows on one side of a narrow rachis; first glume small, hyaline, nerveless, glabrous; second glume and sterile lemma nearly equal, longer than the fruit, 3–5-nerved, densely covered with usually long silky, pale or tawny hairs; fruit cartilaginous, acuminate, dark brown at maturity, the tip pale, the margins of the lemma broad, thin, hyaline, nearly covering the palea, not inrolled.

Slender to rather coarse perennials with flat narrow blades and plumelike (in our species), contracted inflorescences of numerous slender racemes arranged on an elongate common axis.

Species about 15, in tropical and subtropical America and Australia.

Trichachne insularis (L.) Nees, *Agrost. Bras.* 86. 1829. *Andropogon insularis* L. *Syst. Nat.* ed. 10. 2: 1304. 1759. *Panicum lanatum* Rottb. *Act. Lit. Univ. Hafn.* 1: 269. 1778. *P. leucophaeum* H.B.K. *Nov. Gen. & Sp.* 1: 97. 1815. *P. insulare* G. Meyer, *Prim. Fl. Esseq.* 60. 1818. *Tricholaena insularis* Griseb. *Abhandl. Gesell. Wiss. Gottingen* 7: 265. 1857. *Syntherisma insularis* Millsp. & Chase, *Field Mus. Bot.* 1: 473. 1902. *Valota insularis* Chase, *Proc. Biol. Soc. Washington* 19: 188. 1906. *Digitaria insularis* Mez ex Ekman, *Arkiv. Bot.* 13: 22. 1913. Figure 106.

Swamps, pastures, open slopes, clearings, and along railroads at low altitudes; Petén; Izabal; Santa Rosa; Escuintla; San Marcos. British Honduras; Florida to Texas; West Indies; Mexico to Argentina.

Perennial; culms erect or decumbent-spreading from a knotty rhizomatous base, branching, mostly 1–1.5 meters high, usually many-noded, the internodes relatively short; cataphylls densely and softly hairy; sheaths keeled toward the summit, longer than the internodes, sparsely papillose-pilose or papillose-hirsute, the lower ones often densely so, with a tuft of hairs in the throat; ligule thin, 3–4 mm. long; blades 10–30 cm. long, 2–12 mm. wide, flat, acuminate to attenuate-pointed, finely scabrous on the margins; panicles 15–30 cm. long, narrow, dense, tawny, silky, the branches narrowly ascending, spikelet bearing from the base; spikelets 3.5–4 mm. long, obscured by the long silky hairs, the first glume about 0.5 mm. long, glabrous.

TRINIOCHLOA Hitchc.

Spikelets 1-flowered, the rachilla disarticulating above the glumes, not prolonged beyond the floret; glumes thin, usually much shorter than the floret; lemma



FIG. 106. *Trichachne insularis*. Plant, $\times \frac{1}{2}$; spikelet and floret, $\times 10$.



FIG. 107. *Triniochloa stipoides*. Inflorescence, $\times 1$; spikelet, $\times 2$.

firm, rounded on the back, awned from the back above the middle, the apex 2-toothed, the callus densely bearded; palea nearly as long as the lemma, sulcate, the keels approximate.

Perennials with narrow blades and lax, open, few-flowered panicles.

Species 3, Mexico to Ecuador.

Triniochloa stipoides (H.B.K.) Hitchc. Contr. U. S. Nat. Herb. 17: 303. 1913. *Podosaemum stipoides* H.B.K. Nov. Gen. & Sp. 1: 131. 1815. *P. alpestre* H.B.K. Nov. Gen. & Sp. 1: 131. 1815. *Muhlenbergia stipoides* Kunth, Rév. Gram. 1: 64. 1829. *Avena stipoides* Scribn. U. S. Dept. Agr. Div. Agrost. Circ. 19: 4. 1900. Figure 107.

Hills, pine-clad slopes, and cloud forests, mostly 2,000–3,500 meters; Jalapa; Sacatepéquez; Suchitepéquez; Quezaltenango. Mexico; Costa Rica; Colombia and Venezuela to Bolivia.

Perennial; culms numerous in dense tufts, slender, erect or somewhat decumbent at the base, 30–125 cm. high; lower sheaths retrorsely pubescent or pilose, the upper ones scaberulous; ligule hyaline, 7–10 mm. long, those of the lower sheaths much shorter; blades linear, 1–4 mm. wide, usually pilose on the upper surface; panicles 5–20 cm. long, the slender few-flowered branches ascending to spreading or even reflexed, sometimes flexuous; spikelets terete, 1–1.5 cm. long; glumes 3–5 mm. long, acute; awn 1–1.5 cm. long.

TRIPSACUM L.

Monoeocious, the staminate and pistillate spikelets in the same inflorescence; staminate spikelets 2-flowered, in pairs at the nodes of a continuous rachis, one sessile, the other subsessile or pedicellate; glumes membranaceous, equal, many-nerved, the first 2-keeled, the margins rather sharply inflexed; pistillate spikelets solitary on opposite sides on the lower part of the same rachis, sunken in the thickened, hardened disarticulating joints, composed of one fertile floret and a sterile lemma; first glume coriaceous, rounded, the margins nearly enclosing the spikelet; sterile lemma, fertile lemma, and palea hyaline, each successively smaller.

Coarse perennials with usually broad flat blades and one to several racemes in terminal and axillary inflorescences.

Species 9, Mexico, Central America, and northern South America.

Culms relatively slender, about 1 meter high; blades elongate, 1–1.8 cm. wide.

T. lanceolatum.

Culms relatively coarse, 2–6 meters high; blades mostly much more than 2 cm. wide.

Secondary and primary staminate spikelets sessile or nearly so; lower blades with a long, petiole-like base. *T. latifolium*.

Secondary spikelet of each pair of staminate spikelets pedicellate; base of blades not petiole-like.

Sheaths glabrous..... *T. laxum*.

Sheaths, especially the lower ones, strongly hispid..... *T. pilosum*.

***Tripsacum lanceolatum* Rupr. ex Fourn. Mex. Pl. 2: 68. 1886.**

Along small narrow rocky draw, pine-clad hills, between Monjos and Jalapa, about 10 miles south of Jalapa, 1,000 meters, *Steyermark* 32213. Mexico; Honduras; Panama.

Perennial; culms in small clumps, relatively slender, about 1 meter high, sparingly branching from the upper nodes; sheaths glabrous or somewhat hairy on the collar; blades elongate, 1–1.8 cm. wide, narrowed toward the base, papillose-pilose on the upper surface, glabrous beneath, the margins sharply scabrous; racemes solitary, those of the branches scarcely exerted from the sheath; staminate spikelets 5–7 mm. long, the secondary of each pair with a short broad pedicel; pistillate spikelets lanceolate, about 5 mm. long.

The description has been based entirely on the Guatemala specimens cited above. It is provisionally referred to *T. lanceolatum*, since it differs in several respects from the type and Mexican material. Too little is known as yet about *Tripsacum* to describe this form as new.

***Tripsacum latifolium* Hitchc. Bot. Gaz. 41: 294. 1906.**

River banks, ravines, and open hills, sometimes forming extensive stands, up to 1,100 meters; Alta Verapaz (type from Cubilgüitz); Izabal. British Honduras; Honduras; West Indies.

Coarse perennial; culms as much as 6 meters high, glabrous, bearing slender branches from the upper nodes; blades 70 cm. to more than 1 meter long, 2.5–8 cm. wide, acuminate, especially the lower ones narrowed to a long petiole-like base, papillose-pilose or papillose-hispid above, nearly glabrous beneath; spikes 2 or 3 in the terminal inflorescences, solitary on the branches, slender, drooping; both staminate spikelets of each pair sessile or subsessile, 4–6 mm. long, obtuse, rather densely pubescent, the keels hispid toward the summit; joints of the pistillate part of the spike 5–7 mm. long, the spikelet broadly ovate.

***Tripsacum laxum* Nash, N. Amer. Fl. 17: 81. 1909. *T. fasciculatum* Trin. ex Aschers. Bot. Zeit. 35: 525. 1877. Not *T. fasciculatum* Rasp. 1825. *Caña de Casa* (Izabal); *Guatemala grass*.**

Edges of pine forests, slopes, and hilltops, up to 2,000 meters; Izabal; Guatemala. British Honduras; Mexico; El Salvador.

Perennial; culms coarse, erect, commonly 2–3 meters high, branching from the upper nodes; sheaths glabrous; blades 2–6 cm. wide, somewhat cordate, the margins scabrous; racemes usually solitary or in pairs, sometimes more in the terminal inflorescence; staminate spikelets about 8 mm. long, the primary one of each pair sessile, the secondary pedicellate, the pedicel flattened, rather broad, about 2 mm. long; pistillate portion of racemes thickish, the spikelets rather broadly ovate.

The above description applies to Guatemala specimens, which differ in some respects from Mexican material, especially that which has been accepted as the type.

Tripsacum pilosum Scribn. & Merr. U. S. Dept. Agr. Div. Agrost. Bull. 24: 6. f. 1. 1901.

Rare on grassy slopes, lower slopes of Sierra de las Minas, along trail above Río Hondo, 250–900 meters, Zacapa, *Steyermark* 29558. Mexico.

Similar to *T. laxum*; sheaths, especially the lower ones, strongly hispid; staminate spikelets about 6 mm. long, the pedicel of the secondary spikelet rounded, rather slender, about 3 mm. long.

The specimen cited lacks all but the upper sheaths, which are papillose. The staminate spikelets are shorter than those of the type.

TRisetum Pers.

Spikelets 2–3-flowered, the rachilla usually villous, disarticulating above the glumes and between the florets (in our species), prolonged beyond the uppermost floret; glumes somewhat unequal, acute, the second usually longer than the first floret; lemmas usually short-bearded at the base, 2-toothed at the apex, bearing from the back, below the cleft apex, a straight and included or usually geniculate and exserted awn (minutely lobed and awnless or nearly so in *T. pringlei*).

Slender to tall and rather coarse perennials with usually flat narrow blades and open or narrow and rather dense panicles.

Species probably about 75, in temperate and cold regions of both hemispheres.

Spikelets awnless.

Panicles open; lemmas densely pilose *T. pringlei*.

Panicles narrow, the few branches appressed; lemmas scaberulous.

T. angustum.

Spikelets awned.

Panicles dense, spikelike; lemmas densely pilose *T. rosei*.

Panicles open, or if narrow, at least not spikelike.

Panicles silvery, almost plumelike from the copious callus hairs protruding from the glumes; glumes nearly equal in size and shape, 1-nerved.

T. deyeuxioides.

Panicles greenish or purplish, not plumelike, the callus hairs short; first glume 1–3-nerved, the second broader, 3-nerved.

Lemmas strongly scabrous throughout; awn inserted about one-third below the tip of the lemma *T. irazuense.*

Lemmas finely scabrous or glabrous; awn inserted about the middle of the lemma.

Blades very firm, strongly nerved, very scabrous on the under surface; lower lemma 8 mm. long *T. altum*.

Blades relatively thin and lax, scaberulous; lower lemma 6 mm. long.
T. pinetorum.

Trisetum altum Swallen, *Phytologia* 4, no. 7: 423. 1953.

Pine woods east of Finca Piamonte, El Progreso, 2,500 meters, *Steyermark* 43836 (type).

Perennial; culms erect, 135 cm. high, glabrous; sheaths much shorter than the internodes, rather prominently retrorsely scabrous; ligule hyaline, 5–8 mm. long; blades as much as 30 cm. long, 3–4 mm. wide, firm, strongly nerved, very scabrous on the under surface, sparsely pilose with long hairs on the upper; inflorescence 22 cm. long, about 4 cm. wide, the branches in somewhat distant fascicles, ascending, the lower ones as much as 10 cm. long with shorter ones intermixed; glumes narrow, acute or acuminate, scabrous on the keel, the first 7 mm. long, 1-nerved, the second 8 mm. long, 3-nerved; lower lemma 8 mm. long, scabrous, minutely toothed, awned from just above the middle of the back, the awn about 6 mm. long, twisted and contorted in the lower part.

Trisetum angustum Swallen, *Phytologia* 4, no. 7: 423. 1953.

Top of dry ridge in pine forest, between San Sebastián and summit of Volcán Tajumulco, San Marcos, 3,800–4,600 meters, *Steyermark* 35525 (type).

Perennial; culms slender, densely tufted, erect or ascending, 12–24 cm. high; sheaths glabrous or the lower ones pubescent; blades 3–8 cm. long, 1 mm. wide, those of the innovations densely pilose, those of the culm glabrous or sparsely pilose; panicles 4–8 cm. long, very narrow, the few rather distant branches closely appressed; spikelets 2-flowered; glumes acute or acuminate, 1-nerved, the first narrow, 3.5–4 mm. long, the second broader, 4–5 mm. long; lower lemma 4.5 mm. long, scaberulous, the tip minutely and irregularly toothed, the midnerve excurrent in a very short mucro.

Trisetum deyeuxioides (H.B.K.) Kunth, *Rév. Gram.* 1: 102. 1829. *Avena deyeuxioides* H.B.K. *Nov. Gen. & Sp.* 1: 147. 1815. *Trisetaria deyeuxioides* Poir. in *Lam. Encycl. Suppl.* 5: 366. 1817. *Avena trichopodia* Presl, *Rel. Haenk.* 1: 254. 1830. *Deyeuxia triflora* Nees, *Linnaea* 19: 691. 1847. *Pajisa* (Jalapa).

Slopes and wet meadows, 1,250–3,500 meters; Jalapa; Guatemala; Sacatepéquez; Suchitepéquez; Chimaltenango. Southern Mexico to Panama; Colombia, Venezuela, and Ecuador.

Slender lax perennial; culms erect or decumbent-spreading at the base, 70–120 cm. high, simple or sparingly branching; sheaths glabrous, usually longer

than the internodes; ligule thin, truncate, 2–4 mm. long; blades 8–25 cm. long, 2–6 mm. wide, scabrous, sometimes pilose on the upper surface; panicles 10–25 cm. long, narrow, silvery, the short branches ascending, somewhat flexuous, spikelet-bearing nearly to the base; spikelets 5–6 mm. long, 2-flowered; both glumes narrow, 1-nerved, subequal, nearly as long as the spikelet; lemmas narrowly lanceolate, glabrous, the hyaline tip bifid, the lower one 4.5–5 mm. long, the callus densely hairy, the hairs about 3 mm. long; awn 7–8 mm. long, fine, twisted below, attached about the middle of the lemma; rachilla conspicuously hairy, the hairs at the summit of each segment much longer than the rest, reaching more than half the length of the lemma.

Trisetum irazuense (Kuntze) Hitchc. Proc. Biol. Soc. Washington 40: 82. 1927. *T. gracile* Fourn. Mex. Pl. 2: 108. 1886. Not *T. gracile* Boiss. 1845. *Calamagrostis irazuensis* Kuntze, Rev. Gen. Pl. 2: 763. 1891. *Trisetum fournieranum* Hitchc. Contr. U. S. Nat. Herb. 17: 326. 1913. *T. scabriflorum* Hitchc. Contr. U. S. Nat. Herb. 24: 358. 1927. Figure 108.

Pine or pine-fir forests, moist or rocky slopes and ravines, and alpine meadows, 1,800–4,400 meters; Chimaltenango; Sololá; Huehuetenango; Quezaltenango; San Marcos. Southern Mexico; Costa Rica; Panama; Colombia; Venezuela; Ecuador.

Perennial; culms loosely tufted, erect or somewhat decumbent at the base, 50–90 cm. high, flattened, glabrous; lower sheaths crowded, densely villous, the upper distant, elongate, glabrous or nearly so; ligule erose, truncate, about 1 mm. long; blades flat, mostly 8–15 cm. long, 2–4 mm. wide, sparsely pilose on both surfaces; panicles 12–20 cm. long, suberect or nodding, the branches usually ascending, somewhat flexuous, some of them naked at the base for 1–2 cm., as much as 7 cm. long; spikelets 5–8 mm. long, 2–3-flowered; glumes shorter than the spikelet, the first 4–5 mm. long, 1-nerved, narrow, acuminate, the second much broader, 5–6 mm. long, 3-nerved, abruptly acuminate; lemmas lanceolate, slightly toothed, 5-nerved, scabrous and minutely wrinkled on the back, the lowest one 5–6 mm. long; awn 7–10 mm. long, twisted in the lower third, inserted about one-third from the tip of the lemma.

Trisetum pinetorum Swallen, Phytologia 4, no. 7: 424. 1953.

Ridges and pine-*Abies* slopes, 2,500–3,700 meters, Volcán Santo Tomás, Quezaltenango, *Steiermark* 34824 (type).

Perennial; culms slender, tufted, erect or ascending, 35–70 cm. high, glabrous; sheaths mostly shorter than the internodes, the uppermost elongate, glabrous; ligule hyaline, 2–3 mm. long; blades linear, elongate, 1–2 mm. wide, scaberulous; panicles 8–15 cm. long, narrow, rather dense, somewhat interrupted, the lower branches about 3 cm. long, appressed; spikelets 2-flowered; glumes subequal, acute, the first 1-nerved, the second 3-nerved; lower lemma 6 mm. long, smooth below, scabrous above, the tip lacerate-toothed, the awn inserted about the middle of the back, 10–12 mm. long, geniculate, twisted below the bend.



FIG. 108. *Trisetum irazuense*. Inflorescence, $\times 1\frac{1}{6}$; spikelet, $\times 8$.

Trisetum pringlei (Scribn.) Hitchc. Proc. Biol. Soc. Washington 40: 82. 1927. *Graphophorum pringlei* Scribn. ex Beal, Grasses N. Amer. 2: 561. 1896.

Damp meadows and grassy slopes, 2,800–3,700 meters; Totonicapán; Huehuetenango. Mexico (Oaxaca and Chiapas); Costa Rica; Panama.

Slender, densely tufted perennial; culms erect, 15–45 cm. high, glabrous; leaves mostly crowded toward the base in a dense cluster, softly and rather densely pubescent; blades firm, convolute, navicular, erect, 4–12 cm. long; panicles narrow, lax, somewhat drooping, 7–12 cm. long, the short slender scabrous branches ascending, sometimes flexuous, often naked at the base; spikelets 4–5 mm. long, 2-flowered, the florets distant, the upper one readily deciduous; glumes glabrous, unequal, the first 1.5–2 mm. long, 1-nerved, the second 3 mm. long, 3-nerved; first lemma 3.5 mm. long, 5-nerved, densely pubescent, rounded, obtusish, minutely notched, rarely with a short awn; second lemma similar but smaller; rachilla densely hairy.

Trisetum rosei Scribn. & Merr. Contr. U. S. Nat. Herb. 8: 289. 1905.

Around summit of Volcán Santa María, 4,200 meters, Quezaltenango, *Steyermark* 34203. Mexico.

Perennial; culms densely tufted, erect, 20–85 cm. high; sheaths usually densely retrorsely pubescent or pilose, the lower ones crowded, those of the culm elongate; ligule 1–2 mm. long, ciliate; blades pubescent, firm, involute, especially those of the innovations, sometimes flat, the upper ones reduced, flat, as much as 5 mm. wide; panicles dense, spikelike, pale or usually purple-tinged, 6–12 cm. long, about 1 cm. thick; spikelets 5 mm. long, the glumes broad, similar, acute, a little shorter than the spikelet, the first 1-nerved, the second 3-nerved; lower lemma 5 mm. long, densely pubescent below the awn, nearly glabrous above, the awn 3–4 mm. long, divergent, inserted about one-third from the summit.

TRISTACHYA Nees

Spikelets short-pedicellate in groups of three at the ends of the branches or branchlets, 2-flowered, the lower floret staminate or sterile, the upper fertile, the rachilla disarticulating below the fertile floret, forming a sharp-pointed hairy callus; first glume 1-nerved, the second 3-nerved, longer than the first; lemma of lower floret similar to the second glume; lemma of fertile floret terete, firm, 5-nerved, the tip lobed, bearing between the lobes a stout, 2-geniculate awn, the lower two segments tightly twisted.

Tufted perennials with narrow blades and few-flowered panicles of large spikelets.

Species 5, in Mexico and South America.

Tristachya avenacea (Presl) Scribn. & Merr. U. S. Dept. Agr. Div. Agrost. Bull. 24: 23. 1901. *Monopogon avenaceus* Presl,

Rel. Haenk. 1: 324. t. 44. 1830. *Caragua* (Chiquimula). Figure 109.

Pine slopes and rocky stream banks, 1,000–1,700 meters; Chiquimula; Quezaltenango. Mexico.

Perennial; culms tufted, erect, 90–120 cm. high, the nodes appressed-bearded; lower sheaths longer, the upper ones usually shorter than the internodes, sparsely hispid to nearly glabrous, the lowermost densely villous toward the base; ligule ciliate, less than 1 mm. long; blades linear, elongate, 3–6 mm. wide, sparsely



FIG. 109. *Tristachya avenacea*. Inflorescence, $\times \frac{2}{3}$.

papillose-hispid on the upper surface to glabrous, the margins scabrous; panicles 10–22 cm. long, the branches paired or usually solitary, rather stiff, narrowly ascending, densely pilose in the axils; glumes brown, glabrous, the first 1.5–2.5 cm. long, the second 2.5–3.0 cm. long; fertile floret about 8 mm. long including the callus, the back pubescent, the lobes inconspicuous, 1 mm. long, the awn as much as 6 cm. long, the terminal segment curved or flexuous.

TRITICUM L.

Spikelets 2–5-flowered, solitary, sessile, alternate on opposite sides of a continuous rachis, the rachilla disarticulating above the glumes and between the florets; glumes broad, abruptly mucronate or awned, the tip more or less toothed; lemmas firm, awned or awnless.

Annuals with flat blades and terminal spikes.

Species about 10, one commonly cultivated in temperate regions around the world.

Triticum aestivum L. Sp. Pl. 85. 1753. *T. sativum* Lam. Fl. Franc. 3: 625. 1778. *T. vulgare* Vill. Hist. Pl. Dauph. 2: 153. 1787. *Wheat*, *Trigo*. Figure 110.

Although frequently cultivated in Guatemala, only one specimen has been seen, collected by *Julian A. Steyermark*, no. 34681, in wheat field on Volcán Zunil, Quezaltenango, 2,500–3,800 meters. Cultivated in all temperate regions.

UNIOLA L.

Spikelets laterally compressed, few- to several-flowered, the rachilla disarticulating above the glumes and between the florets (tardily or not at all disarticulating in our species), with 1–4 empty lemmas below the fertile florets; glumes narrow, compressed-keeled, acute or acuminate, the first 1–5-nerved, the second 3–5-nerved; lemmas compressed-keeled, 5–several-nerved, the nerves often obscure, acute or acuminate, awnless or sometimes mucronate; palea shorter than the lemma, the keels straight (in our species) or prominently bowed.

Slender to coarse perennials with flat or convolute blades and open or usually narrow and rather dense panicles of compressed spikelets.

Species 10, in warmer regions of America.

Uniola pittieri Hack. Oesterr. Bot. Zeitschr. 52: 309. 1902. Figure 111.

Sea beaches, Ocós, Río Naranjo, Quezaltenango. Mexico; Honduras; Costa Rica; Panama; Ecuador.

Stout, glabrous, extensively stoloniferous perennial; culms in large clumps, 55–100 cm. high, some of the internodes elongate with 2–4 very short ones between



FIG. 110. *Triticum aestivum*. Plant, $\times \frac{1}{2}$; spikelet and floret, $\times 3$.



FIG. 111. *Uniola pittieri*. Plant, $\times \frac{1}{3}$; spikelet and floret, about $\times 3$.

them, the leaves thus appearing in groups; sheaths rounded, glabrous, villous in the throat and on the margins; blades elongate, very firm, attenuate to a fine tip, 8–10 mm. wide toward the base, flat but soon becoming convolute, usually curled toward the ends, glabrous below, more or less scabrous on the upper surface and on the margins; panicles usually 20–30 cm. long, 3–6 cm. wide, dense, interrupted below; spikelets very shortly pedicellate, very flat, 1–2 cm. long, 8–10 mm. wide; lemmas ovate, acute, ciliate on the keel, the margins densely villous at the base, otherwise glabrous; palea about two-thirds as long as the lemma, narrow, the keels not bowed out, ciliate with fine hairs which protrude beyond the margin of the lemma.

ZEA L.

Spikelets unisexual; staminate spikelets 2-flowered, in pairs, on one side of a continuous rachis, one nearly sessile, the other pedicellate; glumes membranaceous, acute; pistillate spikelets sessile, in pairs, consisting of one fertile and one sterile floret, the latter sometimes developed as a second fertile floret; glumes broad, rounded or emarginate at apex; sterile lemma similar to the fertile, the palea present; style very long and slender, stigmatic along both sides well toward the base. Tall annual, with broad, conspicuously distichous blades, monoecious inflorescences, the staminate flowers in spikelike racemes, these numerous, forming large spreading panicles (tassels) terminating the culms, the pistillate inflorescence in the axils of the leaves, the spikelets in 8-16 or even as many as 30 rows on a thickened, almost woody axis (cob), the whole enclosed in numerous large foliaceous bracts (husks), the long styles (silk) protruding from the top as a silky mass of threads.

Only one species, with numerous varieties.

Zea mays L. Sp. Pl. 971. 1753. *Maize*. Figure 112.

No specimens have been collected in Guatemala, although it is commonly cultivated.

Coarse annual with broad drooping blades; extremely variable in size of plant and character of the pistillate inflorescences.

ZEUGITES P. Br.

Spikelets few- to several-flowered, the lowest floret perfect, the rest staminate, the rachilla joint between the perfect and staminate florets usually elongate; articulation below the glumes, the spikelets falling entire; glumes subequal, broad, obtuse or truncate, often irregularly toothed or lobed, conspicuously cross-veined; lemma of fertile floret broad, usually obtuse, the staminate florets narrower, acutish or subobtuse.

Very slender to rather coarse perennials with broad, flat, usually thin, transversely veined, petiolate blades and open panicles.

Species 12, in tropical America.

Culms erect, coarse, as much as 3 meters high; blades as much as 30 cm. long, 6 cm. wide.....*Z. pittieri*.

Culms very slender, decumbent-spreading with erect or ascending branches; blades not more than 16 mm. wide.

Glumes conspicuously broadened above, 3-4 mm. long; spikelets usually purple or tinged with purple.....*Z. munroana*.

Glumes narrow, scarcely broadened above, about 2 mm. long; spikelets bright green.....*Z. mexicana*.

Zeugites mexicana (Kunth) Trin. ex Steud. Nom. Bot. ed. 2. 2: 798. 1841. *Despretzia mexicana* Kunth, Rév. Gram. 2: 485. pl. 157.



FIG. 112. *Zea mays*. Pistillate inflorescence (ear) and two branches of staminate inflorescence (tassel), $\times \frac{1}{2}$; pair of pistillate spikelets attached to rachis (cob) with mature grains, the second glume showing, $\times 2$; single pistillate spikelet soon after flowering, $\times 4$; staminate spikelet, $\times 2$.

1831. *Zeugites colorata* Griseb. Fl. Brit. W. Ind. 536. 1864. *Senites mexicana* Hitchc. Contr. U. S. Nat. Herb. 17: 370. 1913. Figure 113.

Forests and forest borders, up to 1,700 meters; Alta Verapaz; Chiquimula. Southern Mexico; Honduras to Panama; Colombia and Venezuela to Bolivia.



FIG. 113. *Zeugites mexicana*, about $\times \frac{1}{3}$.

Very slender, decumbent-spreading perennial; culms 15–50 cm. long, wiry, usually rather freely branching, purple, shining, with a sulcus on one side; sheaths usually much shorter than the internodes, sparsely pilose or glabrous; blades 1.5–3.5 cm. long, 6–16 mm. wide, ovate, acute, thin, glabrous or very sparsely pilose, the peduncles 6–10 mm. long; panicles 6–9 cm. long, the slender more or less flexuous, few-flowered branches ascending or spreading, the lower ones often

reflexed; spikelets 5–6 mm. long; glumes equal, 1.5–2 mm. long, about half as long as the fertile floret; staminate florets 1 or 2, about 3 mm. long.

Zeugites munroana Hemsl. Biol. Centr. Amer. Bot. 3: 577. 1885. *Z. hartwegi* Fourn. Mex. Pl. 2: 121. 1886. *Senites hartwegi* Arthur, Torreya 19: 48. 1919.

Moist banks, brushy pine forests and fields, 1,500–3,000 meters; Guatemala; Sacatepéquez; Chimaltenango. Mexico.

Annual; culms erect or usually spreading, the erect or ascending branches as much as 50 cm. long; blades ovate, often petiolate, 2–6 cm. long, 6–12 mm. wide; panicles 1–4 cm. long, the short slender branches ascending to reflexed; spikelets 5–8 mm. long, pale or purple with 1–3 staminate florets above the fertile one; glumes obovate, glabrous, conspicuously cross-veined, the margins irregular, ciliate, the second much broader than the first; fertile lemma similar to the glumes; lemma of staminate florets subacute or obtusish, not ciliate, inconspicuously cross-veined near the summit, glabrous.

Zeugites pittieri Hack. Oesterr. Bot. Zeitschr. 52: 373. 1902.

Edge of woods and along roads, 950–1,100 meters; Suchitepéquez; Sololá. Costa Rica, the type from Alto del Rodeo, *Pittier* 1617.

Perennial; culms coarse, caespitose, erect, as much as 3 meters high, glabrous, simple or sparingly branching at the upper nodes; sheaths mostly much longer than the internodes, glabrous except on the collar, the summit truncate, somewhat auriculate; blades oblong-lanceolate, acuminate, as much as 30 cm. long, 6 cm. wide, with rather thick petioles about 5 mm. long; panicles 20–30 cm. long, nearly as wide, the branches stiffly ascending or spreading, the lower ones sometimes reflexed, usually densely pilose in the axils, the main axis and branches often conspicuously viscid; spikelets green, 7–18 mm. long, with 3–11 staminate florets above the fertile one; second glume very broad, 4–6 mm. long, obtuse or very abruptly acute, minutely ciliate, with a few strong cross-veins, the first a little shorter and much narrower; lemma of fertile floret similar to those of the sterile florets, subacute.

EMENDATIONS

Page 5: Omit *Tripogon*, as it has not yet been recorded from Guatemala.

Middle of page 7:

Lemmas awned from the back; glumes as long as the lowest floret, usually about as long as the spikelet.

Spikelets in fascicles, the terminal fertile, the others sterile.

Lamarckia.

Spikelets all fertile, not in fascicles.

Plants annual; spikelets large in open panicles. *Avena*.

Plants perennial; spikelets small in rather dense or spikelike panicles. *Trisetum*.

Bottom of page 8:

Spikelets large, in groups of three at the ends of the branches. . *Tristachya*.

Spikelets small, evenly distributed in the panicle.

Sterile lemma awned. *Melinis*.

Sterile lemma awnless, the fertile lemma awned. *Arundinella*.

Fertile lemma usually much firmer than the glumes, awnless or awn-tipped.

Spikelets subtended by bristles or enclosed in spiny burs.

Spikelets subtended by bristles.

Bristles persistent.

Spikelets arranged in one-sided racemes. *Ixophorus*.

Spikelets paniculate.

Second glume cordate, the margins broad, winglike. . *Setariopsis*.

Second glume not cordate. *Setaria*.

Bristles deciduous, falling with the spikelet. *Pennisetum*.

Spikelets enclosed in spiny burs. *Cenchrus*.

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